An Address

ON THE

CLINICAL MEASUREMENT OF DIASTOLIC BLOOD PRESSURE AND CARDIAC STRENGTH.

Opening Address of the Winter Session at the North-East London Post-Graduate College, October 27th, 1910.*

BY

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Mr. President and Gentlemen,—I thank you for the honour you have done me in asking me to address you to-night, and also for the choice of subject which you have given me. I am informed that you would like me to speak on the clinical aspects of blood pressure, a subject in which I am particularly interested. It is said, and I believe with truth, that when a man grows old he reverts to the subjects of which he was fond in his youth, and on the 25th of next month it will be exactly forty-five years since I made my first experiment on blood pressure under the guidance of my friend, the late Professor Arthur Gamgee. At that time instruments for recording blood pressure were very few in number altogether, and there was not such a thing in the three kingdoms. The apparatus that I used was not a recording one, and was of the very simplest kind. It was a crude imitation of Marey's haemodynamometer, and consisted of a pomatum bottle, half filled with mercury, and with three holes bored through the cork. In the first of those was fixed an upright tube, about 8 in. long, in which the mercury oscillated freely, and gave the maximum and minimum pressures. The second was similar in size, but had a constriction at one part, so that the mercury oscillated very little in it, and thus the mean pressure was indicated. The third tube was bent, and communicated with the artery. The instrument was very crude, but was nevertheless very serviceable, and by its means I was able to formulate, I believe for the first time completely, the mode of action of digitalis on the circulation. I concluded that it had a threefold action. First, that it slowed the heart through the vagus nerve; secondly, that it increased the power of the heart; and, thirdly, that it contracted the arterioles, and thus raised the blood pressure. The slowing of the heart through the vagus had been noted by several observers before. Traube had noticed a rise in pressure, but he had attributed this entirely to a more powerful action of the heart, and in his earlier work[1] overlooked the effect of the drug upon the vessels. Von Bezold[2] had also noticed a rise in blood pressure, and Lenz[3] a slowing in the flow of blood, but neither appears to have attributed these phenomena to contraction of the vessels. Blake,[4] twenty years previously, had insisted upon the effect of digitalis upon the vessels, but he disregarded its action on the heart; and thus it was that, I think, the complete idea of the action of the drug, such as is now held, was first formulated in my thesis presented to the University of Edinburgh in 1866. It is true that Traube[5] in 1865 mentioned that he had found digitalis to have an action on the vasomotor nerves (*Digitalis wie ich nachträglich gefunden habe auch auf das vasomotor Nervensystem erregend wirkt*). To him therefore belongs the priority of the discovery of the action of digitalis on the arterioles; and, taken along with his previous work, this passage shows that he had obtained a complete knowledge of the action of the drug, yet he did not formulate it in its entirety until 1871.[6] In 1869 I went to work with Ludwig at Leipzig, and after my return to London I published in the British Medical Journal of June 3rd, 1871, a fairly complete account of the apparatus and methods used for ascertaining blood pressure and all the causes which influence its variations. These papers were republished in a small book entitled *Experimental Investigation of the Action of Medicines*, but only 500 copies were printed, and the book was out of print in about six weeks after it was issued.†

It is very likely that many of you, perhaps most of you, are completely acquainted with the physiology of blood pressure, but there may be some here who are not, and for their sakes perhaps you will allow me to follow the plan which I see is adopted in many magazines. Where a story is continued through several numbers, some of these magazines place at the beginning of each new instalment a short summary of what had gone before. It does not greatly inconvenience those who have read the previous instalments, and it is very useful to those who have not.

I will therefore, before proceeding to the subject proper of my paper, say a few words about blood pressure in general, and the headings into which I shall roughly divide the paper are: (1) Blood pressure—what is it? (2) How is it measured in the laboratory? I shall then discuss (3) how is it measured clinically? (4) what do its variations indicate? and (5) how do they help us in treatment?

I.—*Blood Pressure.*

Blood pressure, or arterial tension, is the pressure at which the blood is kept in the arterial system, and which drives it through the capillaries in the healthy body, or makes the blood spout out in a stream from a severed artery. If we suppose the arteries to be empty and the heart begins to beat, it will gradually fill the arterial system. Very little blood will flow at first through the capillaries, but as the arterial system becomes fuller and fuller and its walls more distended, the point will at length be reached when as much blood will flow out in the interval between the beats of the heart as is driven in by each pulsation. The pressure or tension which then exists in the arteries is the blood pressure. It is a most important factor in the circulation, because by it the flow of blood is maintained during the time the heart is resting, and when we remember that the heart rests—that is, is in a state of diastole—thirteen hours out of the twenty-four on an average, we can readily understand the important part which the blood pressure plays. It drives the blood through the capillaries and thus supplies the tissues with nourishment and removes waste from them.

II.—*Measurement of Blood Pressure in the Laboratory.*

The first estimations of this pressure were, I think, made by watching the height to which the blood would spout from a cut artery, but an improvement upon this method was made by Hales, who connected the artery with a glass tube and measured the height to which the blood would ascend. Poiseuille improved upon the method of Hales by using a bent tube partly filled with mercury, and this tube is constantly used at present in some clinical instruments. Ludwig made an immense advance by putting on the mercurial column a long rod furnished with a writing point, by which the movements of the mercury up and down were recorded upon a revolving cylinder. To this recording instrument he gave the name of "kymographion," or more shortly kymograph. The disadvantage of the mercurial column is that when once it is set in movement it oscillates on account of its own inertia, and these oscillations may either greatly magnify or greatly diminish the alterations in the real blood pressure. In order to get rid of this fallacy several instruments have been invented having little inertia and giving a truer record of the movements in blood pressure. The most important of these are probably Fick's and Hürthli's.

The chief variations which blood pressure undergoes are, first, its amount, and secondly, its oscillation, and alterations in both these factors are instructive. In the British Medical Journal for 1871, June 3rd, vol. i, page 583, I gave a tolerably complete table of the causes of alterations both in blood pressure and pulse-rate, and discussed them much more fully than it is necessary to do here.

III.—*Clinical Measurement of Blood Pressure.*

In a paper in the British Medical Journal, July 29th, 1909, and in other places, I have described most of the instruments used for measuring blood pressure clinically.

* The latter part of this address was also given at the meeting of the Reading Pathological Society on October 20th, 1910.

† Reprinted in *Collected Papers on Circulation and Respiration*. First Series. London: Macmillan and Co., Ltd.; New York: The Macmillan Company. 1907.

With these instruments it is comparatively easy to measure the systolic pressure. With the smaller instruments in which the radial artery is obliterated by the pressure of an elastic bulb I find that the personal equation of the observer counts for a good deal, and that two men taking the same pulse may give values varying by no less than 10, 15, or even 20 mm. of mercury. This, of course, depends partly upon the training of the observers, and with practice the differences will become much less, and truer values will be obtained. But with the broad armlet, compressing the arm until the pulse is obliterated at the wrist, I find that the personal equation counts for very little, and that with two observers, one of whom has had considerable practice, and another who is trying the method for the first time, the difference in the result is rarely more than 5 mm. of mercury. It is thus very easy to ascertain precisely the systolic pressure in the vessels, but it is very different when one comes to take the diastolic pressure, more especially as authorities are not quite agreed as to what is the best method of doing this. According to some, the diastolic pressure is to be found by noting the maximum oscillation of the mercurial column, or of the indicator of the aneroid, by which the pressure is being measured. The chief difficulty in the way of this is, that the oscillations will frequently remain of nearly the same extent for 20 or 30 mm., or even more. It is exceedingly difficult to follow the oscillations accurately by the eye, and although they can be graphically recorded on such instruments as Erlanger's or Gibson's sphygmomanometers, yet these are cumbrous, and although they may be employed in hospitals or consulting rooms, they are not adapted for ordinary clinical work. The point of maximum oscillation can be observed on an ordinary von Basch's instrument, and I think even more easily on Oliver's portable sphygmomanometer. Von Recklinghausen's apparatus is much used on the Continent, but, so far as I can see, the advantage it possesses is that of giving larger oscillations than von Basch's, and I do not think it is quite as good as Pachon's oscillometer, which I have brought to show to you in case any of you may not have seen it before. The advantage of this instrument is that the sensibility of the aneroid indicating the oscillations is always the same whatever be the pressure at which it is working. But with all these instruments there is still the difficulty to which I have already alluded, namely, that the oscillations may continue nearly alike in amplitude over a considerable variation in pressure.

Variations in Pressure.

Even with a recording instrument such as Erlanger's the oscillations continue nearly alike in size through as much as 25 mm. difference in pressure, and in a tracing of his which Janeway[7] reproduces it is not the maximum oscillation but the point where the oscillations abruptly grow smaller which is taken to indicate the diastolic pressure.

Strassburger[8] takes the diastolic pressure by keeping the finger on the wrist while the pressure is being increased, and noting the point at which the radial pulse begins to feel smaller. Here, again, the estimation of the point is not easy. I think perhaps the readiest way is to place a stethoscope or phonendoscope on the brachial artery just above the elbow, and gradually to increase the pressure in the armlet. At a certain point the pulse will begin to be heard, loud and hammering, and the point where the sound increases is generally sharply marked. The loud hammering continues for a while and again ceases. The first commencement of the hammering noise may be taken as indicating the diastolic pressure, and the upper limit as indicating the systolic. On releasing the valve and allowing the pressure to diminish the sound again reappears at the upper level, continues for a while, and again disappears at the lower level. The advantage of this method is that it is easily applied, requires no special apparatus, and gives indications which are more easily appreciated than those of other methods.

A considerable improvement in this method has lately been made by Oliver, who fixes a kind of small phonendoscope over the artery by means of a band, so that the operator's hands are left free.

If we take the point of lower pressure at which the sound of the pulse appears loudly on raising the pressure and again disappears completely, or at least becomes much feebler, as indicating the diastolic pressure, we get a pressure as definitely marked as the systolic is by the disappearance of the pulse when the pressure in the armlet is sufficient. It is possible that the true diastolic pressure may be indicated by the loudest intensity of the sound; but the same objection applies to the estimation of loudness of sound as to magnitude of oscillation—namely, that they seem much alike over considerable differences of pressure, and the personal equation enters too much into the estimation to render the observations of any value.

Further experiments, either on a schema or on anæsthetized animals, will show definitely whether the sudden increase in sound may be taken as the diastolic pressure, or, at any rate, what relation it bears to the diastolic pressure.

For convenience sake, in describing the relations between the diastolic and systolic tensions, we may use as symbols T*s* for systolic tension and T*d* for diastolic tension or pressure. As the term "pulse tension" is commonly used to signify the pressure within the arteries generally, some other word must be found to indicate the difference between systolic and diastolic tension. This difference, which is indicated in experiments by the oscillations of the mercurial column connected with an artery, has therefore received the name of "pulse pressure." It is obtained by deducting the diastolic from the systolic tension, and it may be indicated as P*p*. Then $\mathrm{T}s - \mathrm{T}d = \mathrm{P}p$.

By adding together the systolic and diastolic pressures and dividing their sum by 2 the mean pressure or tension is obtained—$\left(\frac{\mathrm{T}s + \mathrm{T}d}{2} = \mathrm{T}m\right)$.

Diastolic pressure has as yet received comparatively little attention, because of the difficulty of ascertaining it, yet it is a factor of great importance, because by its amount, and by the difference between it and the systolic pressure we obtain valuable data in regard to the strength of the heart and the condition of the arterioles.

Its relation to systolic tension has been worked out by various authors. According to Strassburger,[9] the relationship is very constant, and is nearly 1 to 4, or, more precisely, as 100 to 25.4. Janeway's[10] estimation is very nearly the same. He considers the systolic pressure in young males as varying from 100 to 130, and puts the diastolic pressure from 25 to 30 mm. below the systolic. We may, I think, take roughly the relationship of the diastolic to the systolic as 3 to 4, and the pulse pressure to the systolic tension as 1 to 4. But it is quite evident that the pulse pressure or oscillation will depend very much upon the pulse-rate. If the pulse is slow more time is afforded for the blood to run through the arterial system into the venous system during diastole, and so the arterial tension will sink more than usual in the intervals between each pulse. If the pulse, on the contrary, is quicker than usual, there is less time for the escape of blood, and so the oscillation will be less. This may, perhaps, be made more clear by a diagram. The black line indicates

Fig. 1.—Diagram to show the effect of pulse-rate on oscillation of tension or pulse pressure.

such a tracing as one might obtain from a mercurial manometer connected with a vessel when the heart is beating at a moderate rate. If we lessen the beats to one half, as by stimulating the vagus, the oscillations become much greater, as in the line of strokes, whereas, if we increase the pulse-rate, as one can do by dividing the vagus, the oscillations will become much less, as in the finely dotted line. In this diagram I have supposed the heart to remain of exactly the same strength, and I have not taken into account some other factors, such as size of the blood wave, which might complicate the result. When we consider only the pulse-rate, we see that with a rapid rate the pulse oscillation will diminish, and with a slow rate it will increase. Another factor which influences the amount of oscillation is the power of the heart. Supposing that the pulse-rate should remain the

same, if the heart be feeble it will take longer to drive the blood it contains into the arteries. It will not raise the tension so rapidly, and the time between the end of each systole and the beginning of the next will be shorter. The oscillations will, therefore, be less. If the heart be stronger it would drive the blood in more equally, and the interval between the end of one systole and the beginning of the next will be longer, and thus the oscillations will be increased. Another and perhaps a still more important factor is the condition of the vessels. When

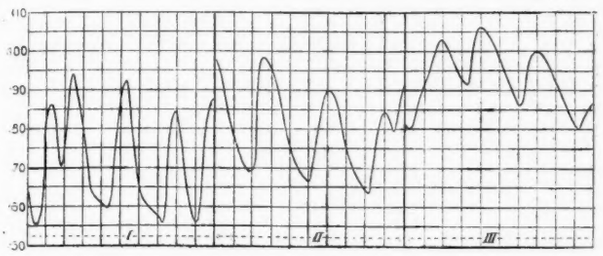

Fig. 2.

these are contracted blood flows slowly out of the arterial system and the arterial tension sinks slowly during diastole. When the vessels are dilated the contrary is the case. I think I may perhaps make my meaning clearer by using as an example some curves of blood pressure which A. B. Meyer and I took in 1867 in Du Bois Reymond's laboratory in Berlin (Fig. 2). The first section of the diagram shows the normal pressure, the second, the pressure after digitalis had begun to exert its action, and the third when the action of digitalis was well marked. The general effect of the drug, as you will notice, is to slow the pulse and raise the tension. The drug has increased the actual force of each beat of the heart, as in the third tracing the systolic tension rises to 100 or 105 as compared with 85 to 93. In the second the oscillation is very considerably diminished. It is diminished, too, in spite of its effect upon the pulse, and in the third tracing it is only about 35 to 60. Thus I may say that diminished oscillation with raised tension such as you see in the diagram indicates the peripheral resistance to the flow of blood. The heart may be actually more powerful than in the normal condition, but it is less powerful relatively to the resistance it has to overcome. If the power of the heart were increased proportionately to the resistance in the vessels the oscillation would be equally great, and if it were increased more than proportionately to the resistance the oscillation would become greater than the normal. If thus we find in a case that the difference between the systolic and diastolic tension is diminished without any further rise, or even with a fall in tension, it is an indication that the heart is probably beginning to fail, while on the other hand, as Strassburger has shown,[11] that if in a case of gouty kidney with raised tension and cardiac hypertrophy the tension itself is increased above the normal it shows that the power of the cardiac beat has not simply increased, but has increased even in relation to the raised tension.

The accompanying tracing (Fig. 3), which was kindly made by Dr. Tunnicliffe some years ago, would appear to show this. The first division shows the commencing action of digitalis; the second when the action is well marked; the third the toxic action where the vagus action is paralysed, and the fourth when the heart is failing. In the second division the pulse is considerably slowed, and pos-

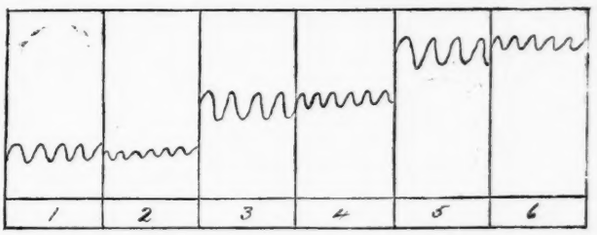

Fig. 4.—Diagram to represent the relation between pressure oscillation and cardiac strength. In *1* the tension is low (as indicated by the slight elevation of the mean pressure above the base line), but the heart is strong, as shown by the amplitude of oscillation; *2*, low tension, heart feeble; *3*, medium tension, heart strong; *4*, medium tension, feeble heart; *5*, high tension, strong heart; *6*, high tension, feeble heart.

sibly this may be the cause of the greater oscillation and not greater comparative strength of the heart.

With a low tension great oscillation shows dilated vessels, with a strong proportion to the arterial resistance, but if with a low pressure we find only a slight pulse pressure it indicates that the heart itself is feeble, and the vessels are not improbably dilated, although, of course, a feeble heart, even with a normal condition of the vessels, would give those signs. For the sake of convenience I have tried to tabulate those different conditions so as to allow of more easy diagnosis. (Fig. 4.).

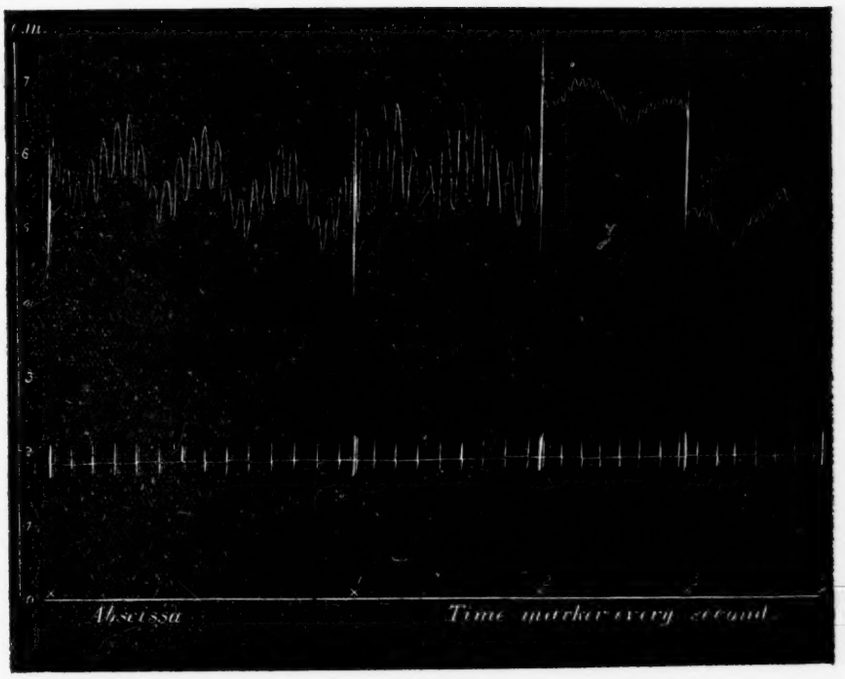

Fig. 3.

Supposing that by the aid of our instruments we have made out the condition of the heart and vessels, the question next arises, What has given rise to the too strong or too feeble action of the heart and the contraction or relaxation of the vessels? To attempt to discuss this question would take hours or days or perhaps even weeks, for it involves the whole physiology and pathology of digestion, absorption, metabolism, and excretion, and as Dr. Jamieson Hurry has shown in his admirable paper on vicious circles cardiac mischief deranges the digestion and excretion and this again reacts upon the heart.

Blood Pressure as a Guide to Treatment.

But some of these questions we may perhaps consider with advantage to-night. Beginning with low pressure I find the two conditions that generally produce it are oversmoking and commencing phthisis. Nicotine has got the most extraordinary power of contracting the vessels and raising the blood pressure. One day while A. B. Meyer and I were working at the action of digitalis in 1867, Professor Rosenthal, who superintended the laboratory

in Professor Du Bois Reymond's absence, demonstrated to us the action of nicotine when injected into the veins. The mercurial column immediately shot up with such violence that it drove the float right out of the tube. I never saw anything like it before, and have only once seen a similar occurrence since, in an experiment which Schäfer and Oliver were making on adrenalin. A single pipe appears to raise the tension for the time being, but it seems as if tobacco, and probably also opium, cause the organism to produce antibodies, which in the intervals between taking the drug, exercise an opposed action. Certain it is that in a very large number of cases I have been able to tell the patient, a good deal to his astonishment, that he smoked too much, without having asked him beforehand any question in regard to smoking. I have met with a few cases where I find a low blood pressure without being able to explain it, except as a result of nerve exhaustion. Where the patient has reduced his tension much by over-smoking, it is generally necessary for him to give up tobacco entirely for a while, as even a small quantity, I think, keeps up the condition. If the low pressure is not due to tobacco the lungs ought to be carefully examined, and sometimes, when the results of auscultation are quite negative, the presence of tubercle may be indicated by the tuberculin reaction. In such cases sanatorium treatment should be adopted.

But it is in cases of high tension that I think the sphygmomanometer is most useful, because by early detection of a rise in pressure, and by the adoption of proper regimen and medicines, the tension may be kept at a lower standard, and dangers which would otherwise accrue to the heart or vessels and to the brain may be avoided. In such cases, as the treatment requires to be carried on, not only for months but for years, it is advisable to interfere as little as possible with the patient's ordinary habits. The only rules that I make in regard to diet is that the patient should take very little, if any, red meat or strong soup. He should eat slowly and masticate thoroughly. He should take neither strong tea, strong coffee, strong wines, nor strong spirits. In regard to exercise, what I insist upon is that rest should be taken for at least twenty minutes after meals, and then exercise should be taken very slowly. Sudden strain of every kind should be avoided, but moderate exercise without strain is rather beneficial. Even in patients suffering from angina pectoris, gentle exercise is useful, provided the patient will begin very slowly, and will take care neither to go too fast nor too far. In regard to treatment we must see where the vicious circle may best be broken. It is quite extraordinary how much the heart can do even if its aortic valves are very deficient, provided the myocardium receives good blood and well aërated. But when the blood becomes impaired in quality or by deficient aëration, then symptoms of distress come on. I have had a patient at hospital who was accustomed to carry hods of bricks up ladders for about eight hours daily. He showed no symptoms of distress, and was quite unaware there was anything the matter with him at all till he caught cold, and then interference with the aëration of the blood caused the strong ventricle to yield, the mitral valves to become relatively incompetent, and all the sequelae of venous engorgement to come on. The lungs become congested, increasing the difficulty of breathing; the liver becomes enlarged, the portal circulation sluggish, digestion and absorption are interfered with, the kidneys become congested, excretion impaired, albuminuria and oedema of the limbs come on, and the physical distress and inability to lie down break the sleep and exhaust the patient. Here, of course, the treatment is to keep the patient in bed with perfect rest, to allow him to do nothing that any one else can do for him, to improve his blood by giving him easily digested food and stomachic tonics, to accelerate excretion by mercurials and salines, and to help the return of the venous blood by massage. Elimination of waste is most important, and mercury in the form of blue pill or calomel should be freely used, and diuretics of the purin class, like diuretin, are useful. Here, too, we find the use of digitalis. The tracings I show you indicate that digitalis contracts the vessels and raises the tension. A theoretical objection would, therefore, be—Why give digitalis in a case where the heart is already labouring, where the patient is blue, and where the circulation is deficient? But a consideration of these tracings will show that, although digitalis contracts the vessels and increases the power of the heart, it actually lessens the work the heart has to do. The plan recommended by Strassburger and improved by Josué[12] for reckoning the actual work of the heart is to take the mean pressure as ascertained by adding the systolic and diastolic pressure together and dividing the sum by two, multiplying these by the pulse-pressure and by the pulse-rate. I am not certain that either the formula or the calculation is quite correct, but as far as I can work it out, if I take the tracings which I have shown you, the normal is equal to 1,406 mm. of mercury in a minute, after the digitalis begins to work it is only 1,229, and when the action is fully established it is only 818, so that in spite of the heart having greater resistance to overcome, the amount of work it does in a given time has actually diminished, and so digitalis gives it rest. At the same time the raised tension increases the nutrition of the tissues, and accelerates elimination by acting as a diuretic. The way in which the action of the digitalis is aided by the association of blue pill is still unknown, but as a matter of practical experience there can be little doubt of the efficacy of the combination. Digitalis thus gives rest to the heart, but rest to the heart cannot well be obtained without rest to the body, and so absolute quiet is necessary. It is also a great help to the heart if some of its work can be done for it. Massage, therefore, I look upon as a most important adjuvant to rest in cardiac disease. It is quite evident that another adjuvant where the vessels are too much contracted is vascular dilatation, and in many cases where you wish to restore the healthy circulation of the vessels it is wise to dilate the vessels as well as stimulate the heart. Amongst drugs the best for this purpose are, I think, the iodides and nitrites. In some cases of cardiac asthma nitrites seem to be little or no use, while iodides give great relief at once. The trouble is that iodides frequently derange the digestion and cannot be continued. Sometimes one can get over this difficulty by using the organic compounds of iodide, sajodin, iodipine, iodiglidine. I have just heard of a new drug—beta-sulphopyrin—which prevents iodism, but I have not yet tried it. Where we wish a rapidly-lowered pressure I think the nitrites such as the nitrite of soda, nitroglycerine, nitroerythrol and spirit of nitrous ether are indicated. Of late years a method of treating cardiac disease has come into practice. By some it is much lauded, but by others it is much slighted. This is the so-called Nauheim treatment, first introduced by the brothers Schott, and consisting in baths, massage and resistance exercises. It is now twenty years since I first examined into this treatment. An old friend of mine who was an army surgeon in India came home with very bad mitral regurgitation. He took a house in Norwood and came up to me once or twice a week for advice. I did the best I could for him by means of drugs, but he did not improve in spite of all my endeavours, and at the end of the summer I told him he must go across to Nauheim. He accordingly went. I followed him to see the method of treatment and to see how he was getting on. He came back very greatly improved, and before the winter set in he was able to return to India to serve out three years and retire with a pension from that time on. This was a test case, because I had done my best to cure my friend, but the Nauheim treatment succeeded where drugs had failed. In August last, my heart having become dilated in consequence of nervous strain, I went to Nauheim on my own account, and was under the care of Professor Schott. The improvement I made was very great, the dilatation became much less, the shortness of breath greatly diminished, and the general strength correspondingly increased. I tried to analyse the conditions that had brought about this satisfactory result, and I came to the conclusion that baths, massage, and resistance exercises all had a great deal to do with it, but their effect was greatly increased by the rest, mental and bodily, enjoined during the treatment. It may interest you to know the treatment which I followed. Breakfast at 8 o'clock, bath at 9 20. Kirsch's Hotel, where I was staying, was about three minutes away from the baths, so that I slowly walked there. After staying in the bath a few

minutes the attendant rubbed me down with hot sheets. I then dressed and returned to the hotel. I then undressed again, went to bed, and stayed there for an hour, going to sleep if possible, but at any rate lying quiet, and if I read at all it was contrary to orders. It was hardly worth while to dress again, so as a rule I simply lay quiet for an hour or more, and then the masseur came, who after massage put me through a number of resistance exercises. It was then time for lunch, so that the whole forenoon had been taken up with the treatment. After lunch I read a little, wrote a letter or two, took a short stroll in the park, and then returned to dinner at the hotel, and then went very early to bed. The effect of the baths was first of all to somewhat slow the pulse and to dilate the peripheral vessels, as was shown by the skin under water becoming of a rosy colour, while that which was out of the water remained white. The effect upon the blood pressure was not constant, and I was unable always to take it under similar conditions. The effect of abdominal massage was rather to raise the tension, probably by driving blood out of the splanchnic area, while the effect of the resistance exercises was somewhat to lower it. Of course as far as regards the good effect of the treatment in my own case there can be no doubt whatever. It may be said that I might have got the same good results by having it carried out at home, but this is just the point. I could not have had it at home. I might have had the baths, I might have had the exercises, but most certainly I could not have had the rest. I have advised a Weir Mitchell rest cure in a good many cases, and in several of them I have been persuaded by the patients and the patients' friends to allow the cure to be carried out at home, but these cases have all failed with one exception, which was that of a married lady without children. The whole of the first floor was given up to her, and she was as completely isolated there as she would have been in any nursing home, and the same is the case with Nauheim. At present I know of no other place where you can get the same complete combination of treatment with rest and arrangements for gentle exercise as there, and it is this that makes the treatment so successful. The *rationale* of it is that it accelerates the circulation and eases the heart by dilating the vessels, while the heart itself is reflexly slowed by the baths. At the same time the mental and bodily rest which is insisted upon is the greatest of all the factors, and is the one that is the most difficult to obtain at home.

The best treatment for an exhausted heart as for an exhausted body is rest.

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THE late Mr. John Langton, Consulting Surgeon to St. Bartholomew's Hospital, has left estate valued at £6,731 10s. 7d.

AT an extraordinary meeting of the Court of Governors of the Middlesex Hospital, held on October 28th, it was unanimously resolved that the President, Vice-Presidents, Treasurers, Weekly Board of Governors, Medical Staff, Governors, and officials of the Middlesex Hospital, desire respectfully to express their deep sympathy with His Serene Highness the Duke of Teck and the members of His Serene Highness's Family in the sad loss which they have sustained by the death of Major His late Serene Highness the Prince Francis of Teck. They wish to place on record their most grateful appreciation of the valuable services His late Serene Higness rendered to the hospital, first as a member of the Weekly Board of Governors, then as a Vice-President and Deputy Chairman, and, finally, as Chairman. His late Serene Highness exerted all his talents and unsparingly devoted his time, to the furtherance of the hospital's welfare; the fruits of his labours in the cause of suffering humanity will remain as a lasting memorial to his name, which is revered and honoured by all who had the privilege of being associated with him in his work.

The FitzPatrick Lectures

ON

GREEK MEDICINE IN ROME.

DELIVERED AT THE ROYAL COLLEGE OF PHYSICIANS OF LONDON,

BY

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LECTURE I.

PRESIDENT AND FELLOWS,—My last lecture* ended with the name of Soranus, and concerning obstetrics.

SORANUS.

Soranus was of the sect of the Methodists, but was far too great a man to be enthralled in any sect. Galen, who angrily repudiated Methodism, yet spoke of Soranus with unwonted respect. The renown of this great physician, from the centuries of Tertullian and Augustine through the Middle Ages, rested chiefly in this field of medicine; but to confine his distinction to any one part of medicine would do him less than justice. Soranus, who received his medical training in the later Alexandria, was a great physician in all Medicine; and, as many of my colleagues are well aware, no inconsiderable part of his notable work on "Acute and Chronic Diseases" has survived in the transcript of Caelius Aurelianus, who lived some 300 years later. Still upon the gynaecology we may tarry for a moment, as upon this side of his work Ilberg has recently published an interesting essay,† an essay which forms a part of the large and scholarly work upon medical classics undertaken by the school of Diels.

The enormous ascendency of Galen, his vast output in which he even surpassed that which amazes us in the writers on many subjects in the first two centuries of the Empire; his intricate and ardent dialectic, which endeared him to the logicians and rhetoricians of his own and many later centuries; his teleological philosophy, which endeared him to the Church; and, above all, the brilliancy and fertility of his genius, by overshadowing obscured and even effaced the traditions and documents of his predecessors. Lost in the glamour of Galen, in the Middle Ages even the invaluable Celsus was forgotten. Not only so, but the animosity of Galen against Methodism threw the work of this school into the greater neglect. Thus it was, as again in the time of the discovery of printing, that a turn of fashion brought destruction to many a precious manuscript. Yet if in the obliteration of his works Soranus was almost as unfortunate as Asclepiades, he was more fortunate in the upholding of his good name; in all later times he has been regarded as a great if half-forgotten physician. If then we have to appreciate the work of Soranus, we have not to refurbish his character.

FRAGMENTS OF SORANUS ON GYNAECOLOGY.

Of his important work on gynaecology but little survives, nothing directly; but by a Cuvierian process of piecing together fossil fragments Ilberg has attempted, not unsuccessfully, to discern and to rectify some farther part of the relics of Soranus concerning this subject.

In the Bibl. Nationale is a manuscript, dating from the end of the fifteenth century (*Parisinus graecus*, 2153) of a kind of Handbook or Articella, a compilation without author's name, the middle or gynaecological part of which is a document of sixty-seven leaves, upon which is written in a rough hand "Σωρανός ἐστιν." On the several attributions of the constituent parts of this handbook, which in the fifteenth and sixteenth centuries had a great vogue in the practice of midwifery, I cannot here dwell in detail; suffice it to say that their distribution is now more explicit. The first critical edition of the Parisinus, by Dietz, was posthumously published, without the advantage of the editor's own care, in 1833, as being, the whole of it, from

* BRITISH MEDICAL JOURNAL, November 27th, 1909, p. 1515.

† Die Uberlieferung der Gynaekologie des Soranus von Ephesus, von Johannes Ilberg. Leipzig: Teubner. 1910. (Das xxviii Bd. der Abhnl d. Phil.-hist. Klasse d. K. Sach. *Geschlft. d. Wissenschaften*. No. II, mi sechs Lichtdrucktafeln. The appendix contains photographs of two pages of the Parisinus MS., and seven of the illustrations from the Brussels MS. of the uterus in normal and abnormal conditions of pregnancy.

the Περὶ γυναικείων πάθων of Soranus. But the part attributable to the master himself was less than half of it. Ermerins did something to discriminate its contents, especially in comparison with those excerpts of Soranus which are imbedded in the XVIth or Gynaecological Book of the Ἰατρικὰ of Aetius, a compiler of the sixth century as yet imperfectly edited. But the Parisinus contains additions, both of sentences and of chapters, which are significant as to authenticity, and are also of substantial importance; especially those on diseases of children, and on anatomy and physiology. The Aetius chapters (XVI, 50–87) seem to have been, as it were, a canvas upon which certain "Soranea" were worked in.

The next important step in the reconstruction of Soranus was taken by Valentine Rose. In the fifteenth and sixteenth centuries a certain Latin book was familiarly known to obstetricians as the *Gynaecia Muscionis*. Its history is a curious one, for it is the Latin form of it which proves to be the original work, the earliest known copy being an illustrated MS. of the ninth to tenth century now at Brussels.* The Greek rendering, under the fancy ("mundgerecht") title of "Moschion," falsely supposed to be based on the "Genetia" of Caelius Aurelianus, and to be of the eighth to ninth century, is much later. It was the erroneous notion of its antiquity which Valentine Rose corrected in an able study (Soranus, 1882) wherein he proved the "Moschion" to be but a translation of Muscio, and—as Moschion—to have a pedigree not older than the fifteenth century; and moreover to be of very subordinate value. Many of the ignorances and errors of this "Graeculus" are set forth by Ilberg. Getting rid, then, of the Greek pastiche, it is on the Latin midwives' book that we are to fall back for such light as it may throw collaterally upon the Soranus from whose hands it was supposed to have come. Thus to verify the Soranus relics these connexions had to be made clear.

Now "Muscio" professes to have had before him two works of Soranus, a brief and catechetical, and an ampler work. He followed in the main the briefer and more didactic of the two, but also he padded out his rendering from the larger treatise. Soranus, in what we know of him, was prone to be sententious, to utter maxims to be learned by rote; this we perceive, for instance, in the substantial fragments of the "Acute and Chronic Diseases" preserved by Caelius Aurelianus. There are similar reasons to suppose also that, after writing his larger books, he drew up a book of Responsiones, or catechism.† Now, in these features of composition Muscio coincides likewise with Soranus as we know him from other sources. The illustrations probably belonged originally to the smaller or catechetical book of Soranus, and were reproduced to facilitate the abbreviation.‡ They have been carefully studied by many commentators, recently by Sudhoff.§

The outcome of this farther study of the Parisinus compilation Ilberg sums up as follows: Of the original date of it there is no evidence; the Byzantine physician put in nothing characteristic of himself or of his period. A tag from Meletius may well have been inserted later. It may have been written in the decadence of the seventh or in the awakening of the ninth century. The anonymous author had before him in its two forms the work of Soranus —Περὶ γυναικείων πάθων, and also the XVIth Book of Aetius; and these he undertook to blend into a new book. Passing over alteration of chapters, the scissors of the compiler were applied to what were probably four books of the original Soranus. Book I, though with some modification of form, he reproduced nearly in full. Book II was also preserved and its order better retained. Book III was more destructively dealt with, and moreover, after the example of Aetius, suffered interpolations and corruptions. Book IV suffered still worse things ("traurig ruinirt"); it was reduced for the most part to perverted scraps. On the whole, it would seem that the Aetius book was the framework of the compilation, and supplied, indeed, the greater part of it; and, as Ilberg remarks, compilers were far less scrupulous than transcribers.

Up to the time of Oribasius the texts of Soranus seem to have been in fair presentation; so that from this valuable compiler many smaller emendations and additions have been obtained. Probably Oribasius contains also more of Soranus, portions at present beyond identification, though some passages of the common Alexandrian tradition may have passed to Oribasius directly from Philumenos.

Soranus as Physician and Surgeon.

Of the traditions which attached Soranus to the earlier Alexandria, one of the chief was the works of Demetrius of Apamea, a disciple of Herophilus who flourished about 250 B.C., whose teaching, especially in respect of etiology, Soranus cites with admiration. It was the boast of the Methodists indeed, especially of the more empirical section of them, that they looked μόνον πρὸς το πάρων, for in their opinion to pry into causes led off to alien curiosity; while the only anatomy they required for clinical purposes (χρηστομαθείας ἕνεκα) was the state of constriction or relaxation of the tissues affected (χαλᾶν ἢ στεγνοῦν); thus for them immediate clinical observation was all in all, and normal physiology a matter of indifference. But it would have been surprising if, methodist as he was, one standing in the following of Herophilus should have accepted the arid universals of that sect, regarded anatomy as ἄχρηστος, as ministering to mere curiosity, and dismissed the study of causes as otiose. In these respects, as in many others, Soranus, as Galen perceived, was greater than his school. The larger idea of molecular biology, and that of disease as a deflexion from the normal, were being degraded into the arid formulas of the later methodists, a sterility which justly provoked the ire of Galen; and from their shackles Soranus did not shake himself free. He was, I think, more of a captive than Ilberg seems fully to admit—to these empty abstractions, the κοινότητες of *strictum* and *laxum*, under which clinical diagnosis fell into little more than the dilemma of στεγνοπαθοῦν καὶ ῥευματιζόμενον ὀξέως ἢ χρονίως. Still it is no less true that these views—these concentrations on τὸ πάρον—fastened attention upon the masterly clinical observations in which Celsus, Soranus, and Archigenes excelled. The capacity of Soranus as a surgeon we may recognize in his teaching on fractures and luxations as preserved in Aetius and Niketas. In Ilberg's words, then, Soranus "ist kein Toter"; both in learning and practice and in loyal regard to tradition he stands on the heights of ancient medicine. His disciples were taught not only "claudere librum ut cogitent," but also, and yet more, *claudere librum ut videant et curent*.

It is in his therapeutics that the methodist doctrines betray themselves unmistakably, as in the ingenuity of local applications to command the permeability of the tissues of the parts affected. In his surgery we find Soranus cautious and conservative; he did not betake himself to operation until other means had failed.

As to his ethical attitude, which was honourable, Ilberg refers us to a paper of his own‖—one to which I have not ready access—on φθόρα, that is, the decision between the life of mother and child, as illustrated by the maxims of Soranus and Aetius.

Pneumatism.

Passing, as needs must, by leaps from period to period, in the next place I propose to invite your consideration of the sect known as the Pneumatists, and of the doctrine and idealism of the Pneuma. I separate the history of the sect from the history of the idea, because as a sect the phase was brief and its doctrines inconsistent, though the idea is one which in manifold forms has dominated and animated the minds of men beyond the domination and beyond the inspiration of any other idea in physiology, and this with a fervency which has penetrated far beyond the limits of the biological sciences. Indeed, as we utter the word "inspiration" we feel that the glow of the spirit, which from the ancient legends of the creation of life to the messages of our modern ethereal telegraphy, from the hauntings of the Great Spirit in primeval man through the storms of superstition to the haven of the soul in his purer communion with the Divine, has moulded the whole story of man, and embedded itself even in his tongue. Inspiration is just air; but what air? What in air, or of it, can be fraught with creative power? and how

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* *Bibl. Roy.*, 3701–3715. (Muscio occupies the second part of it.)

† Cf. the *Interrogationes* of C. A.

‡ There is no difficulty about the date of such illustrations. There were illustrations in Vitruvius. At an earlier date Aristotle refers to σχήματα and διαγραφαί in the *History of Animals*; and at a later Galen seems to have produced diagrams (ὑποδείξεις διὰ γραμμῶν) of the muscles and nerves of the arm, and of optical phenomena. The Alexandrians produced many illustrations.

§ *Studien d. Gesch. de Med.* IV

‖ "Zur gynaekologischen Ethik der Griechen" in the *Archiv für Religionswissenschaft*, xiii, 1910.

can it endow the tabernacle of clay with energy, life, motion, and thought?

One of the most touching aspects of human life is the perennial warfare, the rage between the idealist and the man of affairs; nay, it is even of this war that tragedy and comedy are begotten. It is a materialist prophet of to-day who bewails "the untameable wildness of the good." This is the story of Paul before Festus; of Francis before Elias and the Pope; of the "Lady Helen of Troy pacing to and fro with a nosegay in her golden shawl" before Mrs. Elizabeth Fry; of Garibaldi before Cavour; and in comedy of Quixote before Sancho, or the modern curate preaching Tolstoy before his country rector. "Church," said Mr. Tulliver, "was one thing, common sense was another, and he wanted nobody to tell him what common sense was." The dilemma is *ambulando* insoluble.

And of this kind is the story of the great Ionian idealists, the philosophic dreamers before Hippocrates and Aristotle; and the story of the Greek speculative reason, touched with an oriental mysticism, before imperious Rome. A distinguished modern author of the extremer Western variety has lately reiterated with uncompromising emphasis that in the sphere of ideas we owe all we are worth to the Greeks, a claim, however, which cannot be admitted without profound qualification. The Greek was the prophet of the "*Via Media*"; but to the idealist the *via media* has always been detestable, as detestable to John Knox as to John Henry Newman. The achievement of the Greek was loftiness of the plane on which the seer of both blended and integrated the ideal with the actual; that his *via media* was so high a mean between the imperative categories of the idealist and of the materialist. By an exquisite insight and tact he renounced not only much of the uses of the comfortable and pragmatic kind, but, as we perceive in Plato as well as in Aristotle, he definitely relinquished also the vision of some of the elements pertaining to the ideal society. The Greek saw "the untameable wildness of the good," saw it even with sympathy; but he saw also how much of it would not come into his picture.

The "Practical" Nature of Roman Thought.—Now we observed last year that toward these horizons of blended material and spiritual discernment Rome had not a lofty outlook. We are told, and not without some congratulation, that Rome was too "practical" for such issues; that the average Roman was above all things the practical man. Well, were he as audaciously satisfied as Dr. Archimedes Silverpump of the Lycurgus House Academy, he had notwithstanding his enormous place in the world's history. Still it is true that his work, fundamentally necessary as it was, the necessary foundation upon which modern Europe should be built, was yet but a substructure, and the Roman a labourer to be dismissed when this task was done. And, as we observed also in last year's lectures, while the Roman pavior was wielding his beetle, while with plumb and square he was shaping and laying the great blocks for the edifice upon which we are designing and are building the superstructure, even then ideas could not sleep. We have seen how the leaven of alien minds in Rome was fermenting, expanding, and penetrating to the joints and marrow of her work; and, as if in mockery, displaying upon her sullen atmosphere phantoms of what after her was to be: even then Rome was not permitted to forget that man cannot live by bread alone; not even if the loaf be protected by the policeman. It is this untameableness of ideas, this unconquerable mind of man, which makes the fascination of our story of the Greeks in Rome, as it does of the history of the Jews, or of the ideas of the Jew, in barbarian and in modern Europe. For, if under other guises, the conflict of Pagan, of Jew, of Christian, and of Mammon was never keener or more searching than it is to-day.

Now, as in our own land we often congratulate ourselves—too often perhaps—on being above all things "practical" men, and as in respect of the function of Rome this term is often used as sufficient for all explanation, may we tarry for a moment to ask for some notion of its meaning? For instance, is Euston terminus more "practical" than the Pantheon? or the Pantheon more "practical" than Santa Sophia or the Parthenon? And if so, why and how so? To answer this question must we not consider which of these achievements will have the most abiding use for mankind? Furthermore, we might ask if the ideas of the order of Euston, or of an Atlantic steamship, exist for the sake of the ideas of the Parthenon, of Canterbury, or of William Wordsworth? Or conversely? We cannot pursue this train of thought, but we perceive that by "practical" in the Roman sense we mean the immediate needs, the things and devices of to-day as contrasted with things to come; or as an adept calculation and encountering of transient contingencies as contrasted with larger, future, and more consummate ends. While we admit, then, that Rome was laying the material bases of social order and culture, we perceive that with the issue of this material function her civic life began to decay; for to ends she had contributed little. And we are not surprised then to hear that the Greek too, not Aristotle only but Plato likewise, regarded himself as above all men practical; that in all the schools of ramifying philosophy the conscious, deliberate, and prophetic purpose of each was the art of life. Shall we not, then, consider how we defer to the Roman as conclusively the "practical" person? may we not have to describe him rather as the artisan of a material office, as the pioneer before the architect?

The Prophetic Genius of Ionia.—Now to return to the philosophers of the Homeric land: no work, ardent as it was, inspired as it was, could have seemed more visionary and less practical than theirs. In the later Attic reaction, the restraint of a more measured harmony, their exorbitant speculations seemed overwrought and in the void; Socrates explicitly repudiated their physics, and to this day they are too often regarded as vacuous bombinations. Yet to the prophetic genius of Ionia, the *sapienza poetica* of Vico's happy phrase,* we owe at least four cardinal ideas, ideas which lifted the earth into the universe, revealed the universal spirit, the creative process, and the universal order, the four master ideas which within my present limits I must indicate nominally as the Cosmic idea, the Dynamic idea of a Continuum of streaming and indestructible energy, the Atomic hypothesis, and the compound idea of Natural Law and of Evolution. And to these I might almost venture to add the idea of gravitation. As we glance at this childhood of science, idly noting, perhaps, little more than its obvious puerilities, we are apt to forget the ironical question, What is the use of a baby? Yet some further reflection will make manifest to us, behind this inexperience, an insight and a grip of essential principles which 2000 years have enormously developed in principle but hardly regenerated. It is startling to feel how near us these great thinkers are; how much nearer than Abélard and Aquinas, when they unfurl the canopy of heaven into the air of infinity, when they prophesy of celestial and terrestial physics, of natural law, of evolution from rudiments, of condensation and attenuation, of molecular energy, of formative combustion, and even of mind-stuff.

But to bring these radiant visions under some measure of realization (ποίησις), and to vindicate the values of medicine and natural science independent of philosophy, in the fifth and fourth centuries respectively two men as great, but of other gifts, arose—namely, Hippocrates and Aristotle. The reader of the greater Hippocratic treatises will find, as Gomperz has generously maintained, the door opened upon a way which to us has become so familiar that we find it difficult to understand how in its own day it revealed the growth of a method of thought and discovery wholly new to the world—namely, the scientific method, as contrasted with scientific imagination.†

Now, who was this great Hippocrates, this prodigious man, and was it by the power of medicine that he was fashioned thus out of the visionaries of the age? That he did not stand alone, that he must himself have been the product of a great school and of a great tradition, our historical sense would bear witness. It is no barren fancy to associate the Father of Medicine in our

* For an interesting and discerning comparison of rational analysis with the instinctive, impersonal insight of myth and poetic tradition, often of deep intrinsic philosophical meaning, see Flint, *Study of Vico*, 1884.

† There is no writing extant which brings this new temper so impressively before us as the Hippocratic treatise on Ancient Medicine. Herein is set forth the way of experience, of careful observation of facts. And somewhat sharply controversial as it is against unbridled speculation, and the deductive application of philosophical ideas to the interpretation of natural phenomena, it is yet interesting to note that this treatise is also of Ionian origin.

imagination with the Father of History. Both inherited the luminous Ionian mind; and the author of Airs, Waters, and Places, cradled on the same enticing seas, had likewise travelled widely and observed shrewdly; both saw common things under the species of a large humanity. Indeed, the Hippocratic scriptures themselves also testify to a great school and a great tradition of medicine which, if sown and watered in a forgotten past, bore its golden fruit in Hippocrates, in Aristotle, and in the scientific schools of Alexandria.

In the anonymous Menonian MS. of London, it would seem that Aristotle attributed a certain book of this heterogeneous Hippocratic collection—namely, the Περὶ φυσῶν—to Hippocrates himself; and it is evident that if we could fasten any one of these books upon Hippocrates we should have therein a clew to his personality, and to the authenticity of other books of the canon. Hitherto, as I said last year, we have assumed that certain works marked by breadth of view, scientific temper, and sagacity seemed by these very qualities to proclaim themselves as from the hand of the great master himself. And perhaps this is not altogether to reason in a circle, for such qualities, by the witness of his contemporaries, were his. But, unhappily, these are not the qualities which mark the treatise Περὶ φυσῶν—a title difficult to translate into English, but which may be rendered *Concerning Airs*. Far, indeed, from breadth, precision, and wisdom, the Περὶ φυσῶν is a popular oration as windy in its rhetoric as in its subject-matter. We recognize in its affectations the rules of phrase, trope, antithesis, and cadence, which with a finer art were observed by all Greek rhetoricians, as, for example, in that masterly treatise of the fifth century, the Περὶ τέχνης of the same collection.* It is, in fact, an inferior product of the stoical physiology afterwards, as a school in Rome, known as Pneumatism; and if Aristotle really did attribute it to Hippocrates—well, says Ilberg, so much the worse for the medicine he was taught in Stagira. But I must not occupy you with the pretentious banalities of the Π. φυσῶν;† I have alluded to this tract, as I might allude also to some sentences in the Περὶ τέχνης, only to indicate the prevalence through the Hippocratic period of the doctrines recognized still later as a school under the title of Pneumatism, doctrines which in Rome were taught by the interesting physician Athenaeus of whom I am to speak.

The Origin of the Idea of Pneumatism.—In my remarks on this school I must begin by acknowledging the debt which, in common with all students of the subject, I owe to Wellmann's essay on "Pneumatism and the Pneumatists."‡ Yet I trust that, although without it my own would have been very defective, this sketch may be no mere reproduction of Wellmann's work. Amid the manifold aspects and schisms of Roman medicine I have chosen to solicit your attention at somewhat greater length upon Pneumatism, because among other qualities of interest its central idea seems to me to shadow forth what I have elsewhere ventured to describe as the pathetic quest for oxygen. In the history of opinion we have to beware not only of shaping the opinions of the past by our own, but also to take heed lest, while thus detaching ourselves as critics, and thus desiring to attribute to each of our ancient forerunners just his own uncoloured ideas, we discriminate them with distinctions to which he was a stranger. The ancients had not distinguished, disentangled, or differentiated concepts, or principles, so as to argue within and around them with the precision and discernment of later generations. In those times ideas were not so much mingled as inchoate, and still implicit together; their rudiments had not extricated themselves into separable strands. Ideas were nebulous, approximate, and blended. Logic came afterwards, only too soon, only too systematically; for many a century only to deprive the earlier speculations of their spontaneity and of their naïveté, while masking with its wire grille the vacuity of fact and the lack of verification.

The origins of the idea known for a while as Pneumatism are lost in the backward of time. The soul itself was an air or vapour. Mr. Barnard Cook tells me that the goddess which escaped from the cleft skull of Zeus may be regarded as his soul. In early Indo-European religions the soul in both sexes was conceived as feminine; as, for instance, the Sirens, the Harpies, the Eumenides, and so forth. Thus from Zeus we move immediately to Ether (Αἰθηρ), or ethereal essence, a dynamic conception having many qualities,§ or developing into many; for the pneuma—if I may anticipate the use of this term—was imagined as a yet more primeval substance (Urkörper) out of which when fertilized by a seminal principle (σπερματικὸς λόγος) particulars emerged. Thus the idea of the pneuma contained more than the several notions of air, of vapour, of fire; it was a world force, a Divine reason. And being in "conciliation" with nature, its works were interpreted teleologically; it was in this connexion that pneumatism became allied to stoicism, an alliance at first sight unlikely, as one without radical coherence; but in consistency stoic physical teaching as a whole was lacking, being rather an eclectic array, a syncretism for pragmatic ends, than an organized philosophy.

It is to Galen, whose value as a source of medical history cannot in our dearth of sources be overestimated, that we owe most of our knowledge of Pneumatism in its more developed doctrine. Our knowledge of the system is also enlarged by a pseudo-Galenic handbook, Ὅροι ἰατρικοί, supposed by Rose and by Diels to represent Athenaeus, as it observes his arrangement. But, being of later date—probably of the third century A.D., it contains more than this, and throws some light upon Agathinus, Archigenes—of whom I have more to say hereafter—Leonides, and Heliodorus; and in the manner of the second century is a fusion or tessellation of pneumatism, methodism, and eclecticism. This treatise deals also with the pulse lore with which, as we shall see, the Pneumatists made great play.

The Doctrines of Pneumatism.—To set forth the doctrines of Pneumatism, from their primeval sources to their completion, chronologically, and with due regard to their several exponents, would within our limits be impossible. I will try to sketch the history succinctly. In advancing, then, from the primeval ethereal essence (Σεὺς-ἀιθηρ), we have glanced at an early division into active and passive, into primary force and primary substance, the conjugation and products of which opposites played a large part in much of the later philosophy, without as well as within pneumatist circles. And passing on to the farther evolution of these vaporous essences, we find them elaborated in Plato and Aristotle,‖ from whom the dynamic view of life was carried forward to Alexandria rather through Diocles¶ and the Sicilian school by which Plato was especially influenced, than on the Hippocratean tradition, which indeed was soon to petrify into maxims or "dogmatics." Now it is of peculiar interest to us as physiologists that an effort was made by these medical philosophers to conceive of a dynamic essence "between air and fire"; for here it is that we note the beginning of the pathetic quest for oxygen which, from Empedocles to Lavoisier, drove physicists, chemists, animists, and vitalists, like a gadfly.

I have already reminded you of the rapturous idea of flux revealed by Heraclitus. Worlds away was his rushing, teeming, manifold, many-coloured torrent of life from the grey motionless shadows of the Parmenidean unity. But we must drift down on these subtle airs to the Timaeus, whence, and from other sources, we learn that the whole apparatus of breathing was regarded as independent of the animal organization; the "ζῶον" was already "πλάσθεν"—moulded into form—when this dynamic function was added to it.** The structure of the whole body being pervious to both air and fire, as the most subtle of all

* Vide Theodor Gomperz, *Die Apologie d. Heilkunst*, Second Edition, 1910

† I have written more fully of this treatise in the *Classical Review* for 1910.

‡ *Philologische Untersuchungen*, xivtes Heft. Die Pneumatisch Schule bis auf Archigenes; von Max Wellmann. Berlin, 1895.

§ The element was not active primarily, it was but ποσότης; it was on its quickening into a quality (ποιότης) that it became creative. And it is to the qualities, says Wilamowitz, that the platonic term τὰ στοιχεῖα is properly applicable. The pneuma provided, as it were, the λόγος of this conversion. And, as if this were not ingenious enough, the pneuma was itself regarded as consisting in three phases; ἕξις the grossest, φύσις the generative, and ψύχη the finest—sensation and thought. And above these was the ἡγεμονικόν, or ruling quality placed by Aristotle, Chrysippus, and Athenaeus in the heart; but by some Pneumatists this will or mastery was placed in the brain; but how, said the rest, could it energize in the coolest part of the body?

‖ On this period I am indebted to conversations with Professor Henry Jackson and to Mr. Barnard Cook's *Metaphysical Basis of Plato's Ethics*, 1895.

¶ Personally I am disposed to attribute the Περὶ φυσῶν to some follower of Diocles.

** Tim. 78, c., etc. Body, matter, or substance is perhaps most readily defined for this argument as resistance—inertia; it lay between "void" on the one hand and "form" on the other

created things (*πάντων γενῶν σμικρομερέστατον*), fire drives the air through its pores; wherein we find an early allusion to respiration through the pores of the skin (*διὰ μανῶν τῶν σαρκῶν*), an ancient doctrine at least as old as Empedocles and probably older. Without going tediously into detail, Plato's conception was of a double cage of net or wicker, the outer containing air, the inner containing fire (as it were cages of carbonic acid and oxygen) with inlets to the bodily orifices, so that those agents by alternate inflation and depletion (*ἐκπνόη* and *ἀναπνόη*) should palpitate through the body. We start full; then the air, heated by the fiery envelope, drives by the nearest way through mouth and nostrils; then again, to avoid a vacuum, comes a compression (*περίωσις*), so that the air escapes through the tenuous interstices of the flesh (inspiration), and so onwards by oscillation (*αἴωρα*) through the blood vessels (*φλέβας*) and the cavities *διὰ τῆς κοιλίας*): "Making its course from the inwards to the parts extreme." The corpse differs from the plastic but not yet breathing body in that both soul and "form" have escaped to their refuge (*ὑποδοχή*), and left the "matter," which they had temporarily impressed, inanimate. "To die is to be a counterfeit; for he is but the counterfeit of a man who hath not the life of a man": said another authority. Such in rough outline was the remarkable contemplation of these great thinkers upon that primeval miracle the respiration, the inhalation of life from the invisible circumambient ether, essence, air, spirit, soul. "And He breathed into his nostrils the breath of life, and man became a living soul."*

The next considerable step in medical pneumatism was the fusion or adaptation of this dynamic idea with that of the four elements, fire, air, water, earth—termed the *τὰ ἁπλᾶ* or rational units, and taken by Empedocles as radical substances (*ῥίζώματα*), the creative qualities of which (*ποιότητες*) were hot, cold, moist, dry. This reconciliation seems to have been due chiefly to a certain Chrysippus, a younger contemporary of Aristotle, who may be taken as the philosophical founder of explicit pneumatism, as interpreted long afterwards for medicine in Rome by Athenaeus. Although the very obscure treatise *Περὶ πνεύματος* is not authentic as a work of Aristotle himself, yet no inconsiderable portion of the doctrine, as we may note by the terminology, is Aristotelian.† Galen‡ speaks of Chrysippus as the father of the sect (*πρόπαππος τῆς αἱρέσεως*), but he attributes no small share of it also to the direct influence of Aristotle. The Chrysippus of whom I am speaking was clearly not Chrysippus the Stoic, who lived a century earlier; but this distinction does not quite satisfy for the identification of this renowned physician so frequently quoted by Galen. For it seems probable that in the later fourth and earlier third century there were in Alexandria at least two of the name, father and son. However, merging the lesser in the greater, the greater Chrysippus, who may have been the master of both Herophilus and Erasistratus—of Erasistratus, if not directly yet at any rate indirectly through Metrodorus—was himself of the Cnidian school of medicine, and a disciple of Eudoxus.§ Although he had travelled much and learnt of many, he seems to have retained the Cnidian habit of minute observation of instant detail, of indifference to Coan reasoning upon remoter causes—such, for example, as on "airs, waters, and places"—and of academic logic. This sedulous obedience to fact may have fortified in Alexandria the bent inherited from Aristotle to anatomy, surgery, and symptomatology; and sowed there, moreover, the seeds of the subsequent empiricism and scepticism to which I have more than once referred. By tacking on many little points of agreement,‖ on some of which I shall touch incidentally, as well as by the new ideas with which he enriched medicine, we shall be able to trace the influence of Chrysippus into later times; as, for instance, in the use of herbs and in other notes of therapeutics, especially concerning venesection, on which practice, as I shall show presently, Chrysippus set himself against the whole of ancient medicine, and with the effect on later generations down to Galen, to which, in the history of Asclepiades, we gave some consideration last year. "Chrysippus the Cnidian," says Galen (XI, 150 and 252), "who displaced (*ἐξελὼν*) phlebotomy altogether from our means of cure."¶ But to this important matter I shall return hereafter in some reflections upon the story of the pulse. The works of Chrysippus were still extant in the time of Celsus.

Now I will pass quickly over most of the interminable stoical and more or less pneumatist dialectic, worthy of medieval times, recorded by Sextus Empiricus, Diogenes Laertius and otherwise, as to modes of generation from those units; how on the dominant idea of generation earth and water were passive substances (*παθητικά*), fire and air (*δραστικὰ*) were powers (*δυνάμεις*), and so forth; over much logic also as to fire, heat, air, and pneuma; as to rarity and density (Zeus); as to heat in organic and inorganic bodies respectively; how far—and this is most interesting—fire (or pneuma) was not always a separating agent, but, as in the technical arts (*θερμὸν τὸ ἐργαζόμενον*), might fuse, temper, construct, and modulate them (make rhythm); passages which remind us of the lofty vaunt of Prometheus—

> . . . in the fiery flame that lends
> Its aid to every art.**

Fire, that is, might work either as an element (or substance, *ὕλη*) or as a tool (*ὄργανον*). And if with some thinkers pneuma was regarded as a kind of fire, with others it was regarded as a fifth element or *ἁπλόν*; in either case by their various mingling and the formative fire the several main tissues of the body (*ὁμοιομερῆ*)—that is, bones, flesh, blood vessels, etc., were evolved.†† It was generally agreed, at any rate, that heat, to which at least pneuma could attach itself, was the demiurgic power, and thus that the innate pneuma (*σύμφυτον*) ‡‡ by movement kindled the inward heat (*θέρμον ἔμφυτον*); and by its penetration fused the whole into integration, or uniform harmony (*ἕξις*), promoted growth and propagation (*φύσις*) by way of which thinking comes, "for vapour cannot think," and awakened thought (*ψύχη*); the heat being constantly moderated by respiration. The Sicilians, on the Pythagorean tradition, regarded the heart as the seat of this inner or governing (*ἡγεμονικὸν*) fire, an attribution which I need scarcely say was accepted in the main by Aristotle, and thence was handed down to mediæval Europe. It is peculiarly interesting to us thus to trace the fifth element or quintessence through Aristotle to Harvey, who still conceived it as the universal principle of motion §§ animating all things from the starry sphere of the heavens to the tireless orbit of the heart. For of life the Aristotelian doctrine was that of the three spirits—the vegetative, the animal, and the vital—"the vital is begotten of the purest heart's blood, and conveys the glow of life through the other members, which gives them all the capabilities of action which emanate from the heart's vitality, the arteries serving for the transmission of this spirit to all the members"—

> "Spirtus intus alit, totamque infusus per artus
> Mens agitat molem, et magno se corpore miscet."
> —*Aeneid*, VI, 726.

We perceive, then, that pneumatism was a much larger idea than animism, which in its peripatetic doctrine contemplated the vital principle under three particular forms. Pneuma is nearly identical with the primeval principle of *νοῦς* (Anaxagoras), an energizing principle;

* It is worthy of remark that Laurence Oliphant said, "The sense of union with Christ, of His living in us, was manifested, or became perceptible, in a physical sense, chiefly in changes of the natural respiration."

† On this part of the subject I am indebted to an essay by Neustadt: Ps-Aristoteles, *Περὶ πνεύματος*, Hermes, 1909.

‡ IV. 160; and five or six other passages noted by Neustadt.

§ In his earlier paper in Hermes (1900) Wellmann exposes a certain "chronologische Ungeheuerlichkeit," due to the confusion of the Alexandrian teacher with namesakes; and to his aid I am here again indebted. I may add that Wellmann regards Chrysippus as directly the teacher also of Erasistratus.

‖ Vide Wellmann's useful lists in Susemihl (loc. c t.)

¶ Neustadt, loc. cit.

** ΧΟ. *κἀι νῦν φλογωπὸν πῦρ' ἔχουσ' ἐφήμεροι*;
ΠΡ. *ἀφ' ὧν γε πολλὰς ἐκμαθήσονται τέχνας* (261-2).

†† On the Homomeria, or kinds of structure, of Anaxagoras, vide Lucret., I, 830 et seq.

‡‡ The Pneumatists proper (Athenaeus) identified the pneuma with the innate heat (*ἔμφυτον θέρμον*) as a single entity, and also, with Aristotle, accepted the heart as the seat of it (*τὸ ἡγεμονικόν*).

§§ In their several orbits or spheres (circular as being the most perfect form) whirled the sun, moon, and planets, while the outermost sphere of the fixed stars whirled round the others with an enormous velocity animated by the quintessence of ethereal fire. This universe, a plenum, spun in the infinite void. The expansive elements (fire, air), being centrifugal, and the heavier elements (water, earth), centripetal, the whole was balanced, though it is interesting to note that ultimately all things (even fire itself) tended towards the centre of the earth (gravitation).

yet no metaphysical hypostasis, but something physical the finest matter (ether) vibrating in and through all things, but most vivid in living things.

When Aristotle says, and says truly, that cold condenses (πυκνοῖ) and heat makes more permeable (μανότερον), we seem to be hovering about the edges of Methodism, and to apprehend how and where these outgrowths of doctrine branched away from each other. To the academic student it may seem perverse that with such features in common the various sects of which we are speaking kept so bitterly aloof, each within its own conventional palisade; but in our own day, with far less excuse, are not these tribal animosities still as fierce, almost as stubborn, as they were in certain pneumatists who, according to Galen, put their sect before their country? Many of them, poor things, had no country; and the pneumatists, in the breadth of their ruling idea, seem to us to have been more disposed than men of other sects to sympathize with alien opinion. Thus it was that many of the pneumatist school approached, or indeed joined hands with the Eclectics; but in no period of culture has a consciously eclectic school found the inspiration of life; in all times the doctrines of such schools, like compromises in practical affairs, have formed a mosaic rather than an organic body or synthesis, and have proved therefore to be temporary accommodations, and seminally impotent.

Relations of Pneumatism to Other Doctrines.—So far I have pursued the general story of these ideas without arranging them formally in medical schools, or attributing them exactly to their respective teachers, in order to set forth an explication of so much of the pneumatist doctrine as, with some considerable peripatetic infusion, brought this school of medicine into alliance with the philosophy of the Porch.* For, as I have hinted, it is rather surprising to us to find the quickening leaven of the pneuma so actively at work in association with the Stoics, for whom all emotion was a perversion or a defect of virtue. This inconsistency was not only felt by such later Stoics as Panaetius and Posidonius, but became a subject of apologetic. Diels, however, in his essay on the physical system of Straton, suggests, or rather points out, that the pneumatic doctrine descended to Medicine more directly through this peripatetic teacher to Erasistratus of Alexandria, and thence to Rome. It is in the pseudo-Aristotelian Περὶ πνεύματος that we first find the pneuma definitely accepted as a fifth elemental quality.† And we have seen that the undoubted influence of Chrysippus in the Alexandrian schools pointed to him as the moulder of the theory of Pneumatism. The testimony of Galen, as cited by Neustadt and others, is not inconsistent with this attribution to the Peripatetics, for he says repeatedly that Athenaeus drew freely upon Aristotle. Another most interesting link of the tradition we find again in Diogenes of Apollonia‡—namely, that both Aristotle and Theophrastus avoided any radical distinction between pneuma, as the original or even as the one primary element, in which thinking stuff was implicit, and out of which accordingly came order in the universe, and common air; though they soon entered into refinements, notably as concerning that vague but penetrating apprehension of oxygen—the "substance between air and fire"—on which I have already dwelt. More fancifully, airs might be drier or damper, hotter or colder, more attenuated (spirit) or condensing into phenomena; and so on. Thus Diogenes no doubt contributed to the rhetorical sophistry of which the pseudo-Hippocratic treatise Περὶ φυσῶν, and others like it, consist; a degradation of lofty and prophetic ideas into coarser notions of blasts and tensions of air compressing, expanding, shaping, or disintegrating an inert matter. Thus by ruder and coarser minds two great dynamic ideas—the pneumatic and atomic hypotheses—were debased; while the sagacious and prudent clinics of Hippocrates were frittered away in frothy rhetoric, barren methodism, or formal and arid dogmatics. In the absence of sufficient tests of premisses and of sources this lapse into sterility was perhaps inevitable; moreover, the Roman temper was for such thumb-rule formulas as Themison and the empirics provided. It is true notwithstanding, as we shall see for instance in Aretaeus (or Archigenes), in Heliodorus, and in Galen, that beneath all this sophistry a substantial medical and surgical art was making its way, propagated in the main by the stream of Alexandrian science from Empedocles, Hippocrates, and Aristotle.

The Aristotelan Influence in Alexandria.

In endeavouring to elucidate this propagation and course of scientific ideas after Polybus, Diocles, and Praxagorae through the schools of Alexandria to Rome, I have mentioned the name of Straton. Unfortunately for the historian, the name of Straton, like that of Chrysippus, was attached to several individuals. Of these, one, namely Straton son of Arcesilaus, of Lampsacus, tutor of Ptolemy Philadelphus, succeeded Theophrastus (B.C. 288) as head of the Peripatetic school, and held this position for 18 years, when he was followed by Lycon. Now this was the Straton who devoted himself so assiduously to natural knowledge as to receive the cognomen of Physicus. And Cicero (*Quaest. Acad.*) upbraids him for so giving himself up to nature as to neglect the study of virtue. But there was also a Straton, the same or another, an eminent physician of the third century, who was associated with Erasistratus. He is important enough to receive frequent mention over the centuries from Themison and Soranus (who quotes him on prolapsus uteri) to Oribasius and Galen, and to Alexander and Aetius. He opposed venesection after the manner of his alleged pupil Erasistratus; he was the first physician, so far as we know, to describe elephantiasis; and Erotian quotes him as author of a lexicon of Hippocrates. Haeser seems to identify these two persons; Fuchs (in Puschmann) separates them. The unity or duality of person may be of no great importance, for, if two, they were both in the line of the same tradition; but the force and direction of Aristotelian influence is a question of the keenest interest.

The Sicilian tradition was never free from magical bias, and the Platonic school, which was impressed by it, set back the inductive side of learning. If, like Bacon, Aristotle may seem never to have apprehended, as the Ionians seem to have done, the infinity of the scope and subjects of knowledge, yet by virtue of this very concentration he restored the method of research by the serial order of facts; and like John Hunter two thousand years later, he brought together a vast collection of facts, acquired in great part by personal experience, but also by cautious inquiry, not of philosophers but of practical men, such as fishermen and huntsmen. Now this, we learn, was the very influence which the efficient, if ambiguous, Straton carried to Alexandria. In his own work Straton attempted to base science on experiment, and, in particular, we learn that he made systematic experiments on a "vacuum." So also Aristotle's extensive dissections of animals must have forwarded the study of anatomy in Alexandria. Furthermore, we know that Aristotle collected a large library, and that it probably became the foundation of the Alexandrian. We know also that in collecting these books he did so with a view to a historical co-ordination of knowledge, for which end he organized writers in several departments — Endemus was editor-in-chief; Menon compiled the medical literature; Theophrastus that of minerals, of physics, and of botany; Aristoxenus that of music. Sadly we deplore the utter destruction of all these documents. By certain words and phrases we may trace the passage of these ideas through the Alexandrian schools, especially through Erasistratus down to Athenaeus, the last physician, as we have seen, to build directly upon Aristotle—for example, in the meaning of nature (φύσις), concerning which Athenaeus definitely cites Straton; in the several kinds of the soul; in the hegemony of the heart; and in the theory of generation we recognize Aristotle.

Unfortunately, hitherto the discoveries of papyri in Egypt have brought forth new ancient records of

* I cannot dwell here on the points of difference: such as that for the Peripatetics heat and cold were drastic, and dryness and moisture passive; that Athenaeus regarded these substances variably as sometimes matter, sometimes as forces; that substances or elements, as ποσότητες, were often confounded by the Stoics with their active qualities (ποιότητες)—for example, water with moisture, earth with dryness, and so on. Indeed, the Stoic hair-splittings amidst these permanent or interchangeable logical entities—as between ποσότης and ποιότης, for example—are to us intolerable, and were in respect even of their own time as vain as for his time the logomachies of Duns Scotus.

† In Galen's words (quoted Neustadt, loc. cit.): "Περίττον παρεισάγει κατὰ τοὺς Στωικοὺς το διῆκον διὰ πάντων πνεῦμα."

‡ Recently well edited, with Introductory Essay, by Krause, Posen, 1908-9. This Diogenes is to be distinguished, of course, from the (later) Stoic. Vid. et Diels. Fragmenta in Ed. of Excerpta Menonia and Axon Nelson, Berlin, 1893. Περὶ φυσῶν. Upsala, 1909, p. 101.

Alexandrian medicine.* However, in the British Museum is a papyrus, apparently of just pre-Galenic date (noted by Mr. Kenyon in the *Classical Review* for 1892), which deals with certain points in dispute between the followers of Herophilus and Erasistratus. And Karl Sudhoff (Leipzig, 1909) has recently collected many interesting notes concerning drugs, customs, diet, and baths; and on temple and hospital matters: but no fragment of any great writer, nor any illumination of the history of ideas, has turned up as yet. From such sources as we have, we learn that in the period of comparative peace which ensued in Alexandria after the internecine strife of the Diadochi until the expulsion of the physicians and the *savants* to the islands and Asia Minor from Alexandria by Ptolemy VII (Physkon), a strange contrast to his predecessors, and before the diversion of the main stream of culture from Alexandria to Rome, burst forth that brilliant school of which we know so much by the glory of its notable achievements and so little by its documents. Moreover, under the Empire, and even in the later years of the Republic, the intercourse between the two cities both in trade and culture had become easy and continual. Celsus, for instance, in his therapeutical advice to consumptives, speaks of the voyage from Italy to Alexandria, even in the petty craft of those days, as "aptissime." In Alexandria, then, Hellenism had its fling, touched, however, more and more by Oriental influences, especially of that learned and ingenious race the Jews† and Syrians, of whom even then there were many in the city; influences which a little later, in the Neo-Platonic and Christian schools, became potent, and even ascendant, down to the second great fire of the Alexandrian libraries in the fourth century.

We have seen, then, that the powerful and insatiable mind of the Greek from Anaximander to Plato, before the discipline of observation and analysis initiated by Hippocrates and Aristotle, had achieved certain general ideas of cosmic scope and significance. These ideas once apprehended, the framework of orderly knowledge had to be built up by more laborious methods. The difficulty then lay in the gearing of this tremendous thinking engine to practical work. While unharnessed, it spun about itself with enormous velocity, weaving out of its own dust what Francis Bacon called its cobwebs. These buzzing and ineffectual revolutions are almost more audible to us in the first centuries after Christ than in the thirteenth. For a season in Alexandria this tremendous energy was buckled to the real work of spinning webs, not of notions only, but of facts—of things, that is, which had happened, which were happening, and which experimentally might be made to happen. And in the Aristotelian tradition we know how brilliant were the results of these Alexandrian scientists, not only in celestial and terrestrial physics, but also in biology. For in this college the names of the great anatomists Herophilus and Erasistratus are even more familiar to us than those of Hipparchus, Archimedes, and Heron.

Alexandrian Medicine.

But to proceed with the sketch, so far as relics and fragments enable us, of those features of Alexandrian medicine which appear in Roman medicine, and in our present concern with the pneumatists. Speaking very generally of the two great anatomists, Herophilus—one of whose masters was the Coan Praxagoras—led more directly from the Hippocrateans to Galen; Erasistratus from Cnidists to the Methodists and Pneumatists. And we can get a little nearer, perhaps, to the facts than this, though the respective disciples, or nominal disciples, of these masters perplex the modern historian by their manifold inconsistencies, vagaries in which the Herophileans particularly erred, even forfeiting the birthright of their school by shirking its anatomy and, with the frowardness of the Christians after them, dissipating the master's teaching in sophistries, and elaborating a wiredrawn dogmatic system upon the flimsy foundation of glosses and commentaries on the texts then intact in the vast libraries of their city.‡ The Erasistrateans were more steadfast; they kept closer to their doctrine, and seem to have adopted much of the teaching of Straton the Aristotelian; they kept up at any rate some anatomy, even down to the second century A.D. (Galen), and on their empirical side did better service than their dogmatizing rivals.§ And accordingly the Erasistratean school on the whole prevailed.

Herophilus, born at Chalcedon, lived and worked in Alexandria under the first, and perhaps in part under the second, Ptolemy. In the eastward expansion of Greek scientific culture his doctrines were carried to Pergamon, and later to Laodicea. It is worth noting, in respect of the tradition leading down to Galen, that under the Attalid kings Pergamon was, at some interval, comparable in culture even with Alexandria; and schools were perpetuated there till Galen's time, although apparently with some decline; for we are told that when in Caesar's campaign the library of the museum—not of the Serapeum—was burned, the Pergamene library was brought to Alexandria, only at a later time to be destroyed, with the Serapean, by religious fanatics. The school of Smyrna, on the other hand, by way of which, as we shall see, the prescription of wine as a medicine probably reached Asclepiades and Athenaeus, was founded, as we learn on the contemporary authority of Strabo, in the first century B.C., by Hikesios, and he was an Erasistratean.‖ But to return to Herophilus; Haeser reminds us that, great as were his researches in anatomy, especially as regards the nervous system, yet before him Praxagoras seems to have made no inconsiderable advances in this study. He had distinguished, for instance, between the motor and the sensory nerves, although he presumed that the sensory nerves arose "in the centre of feeling—the heart." But over the earlier schools,¶ as also over Galen and the later, the Alexandrians had the incalculable advantage of dissecting the body of man.** Herophilus advanced to the demonstration of the origin and course of the nerves from the brain and spinal cord,†† and described many of the parts of the brain, including the meninges; and he it was who recognized this noble member—hitherto regarded merely as a refrigerator for the inward heat—as the source of sensation and of volition. On his description of the liver, pancreas, chyle-vessels, and many other members—descriptions, new in part, in part enlargements of previous knowledge—I cannot now dwell; but to his views of the circulation I shall return presently, when we come to discuss the pulse lore of this period and of the Roman pneumatists. Herophilus probably described the anatomy of the eye, as we know from Aetius that he wrote a treatise Περὶ ὀφθαλμῶν. To this great and precise observer Galen was deeply indebted; yet these Alexandrian anatomists never cleared up the confusion under the name νεῦρα. They still regarded nerves and tendons as varieties of one kind; varieties because they perceived that the nerves came from the brain and spine, but the tendons from the bones and muscles.‡‡ As a physician Herophilus, in opposition to Erasistratus, clung to the four humours of Hippocratic tradition, and opposed him furthermore in matters of pharmacy, dietetics, and hygiene; subjects with which he dealt at large in a work Περὶ αἰτιῶν.§§

It would have been well if medical science could have continued patiently on these more positive, although it

* Even of later date the medical finds are scanty. Meyerhof and Pflüger discovered in a library in Cairo some unknown MSS. on eye diseases of Arabian origin, and Meyerhof adverts to such relics in Damascus and Constantinople. These may prove to be translations of older treatises.

† It is said that in the reign of Augustus there were a million Jews in Alexandria; and we know there were Jewish physicians in the first century A.D.

‡ The name of Dogmatists was given to this school, if I remember right, by Galen. In working rather by the letter than in the spirit of their great founder, Hippocrates, they became the Pharisees of Ancient Medicine, as in after time were the Galenists.

§ Besides the historical treatises already cited I am, in what follows, indebted also to Susemihl's *Gesch. d. Griech. Litt. in der Alexandrinerzeit*, Leipzig, 1891. This scholar at any rate perceived that from a history of culture Medicine could not be omitted. The medical sections are in great part from the pen of Wellmann.

‖ Strabo, xii, 580.

¶ That is speaking generally. Galen credits Diocles with some knowledge of anatomy, and there is reason to suppose that both this physician and Praxagoras, and so presumably some others, had dissected the human body. But in Alexandria there was an Anatomical Institute in which human bodies, as Galen says plainly concerning Herophilus, were dissected. (II, 895: "οὐκ ἐπὶ ἀλόγων ζώων καθάπερ οἱ πολλοί, ἀλλ' ἐπ' αὐτῶν τῶν ἀνθρώπων πεποιημένος.")

** Much more evidence would be necessary to compel us to believe the malignant insinuation of Tertullian that these anatomists opened the bodies of living men (criminals). Such brutality, not alien to the Roman, was foreign to the Greek.

†† Galen, viii, 212.

‡‡ Cf. Daremberg's edition of Rufus.

§§ A certain Heracleides Erythraeus, lauded by Galen, a contemporary of Strabo about the Christian Era (placed by error in Haeser I see in the third century B.C.; there were three or four physicians of the name), wrote a long treatise on the "sect" (αἵρεσις) of Herophilus, but unfortunately nothing of it remains.

must be confessed still somewhat nugatory, methods. It has been the trial of Medicine that while, as compared on the one hand with the no less complex but far more accessible phenomena of politics, and on the other with the far less complex phenomena of the physical sciences, it has stood in respect of the difficulty and inaccessibility of its knowledge, and stands still, at an enormous disadvantage; yet, in no unnatural impatience with these perennial bafflings and obscurities, the moan of suffering men and women and the poignant misery of the child have ever driven us into action, however blind, however premature. Remedies, orthodox, empirical, or quackish, remedies one way or another, and by whatsoever means, have always been imperiously demanded of us. And, as nowadays the modern physician cannot wait for pharmacology, which seems to him, and not untruly, to be the tortoise behind the hare of empirical practice, so after a like manner we may imagine the impatience of Alexandrian physicians and sick with the pursuit of anatomy. Except in respect of surgery, the lost anatomical treatises of Herophilus himself could have contained but little of any immediate application to inner medicine. Such, then, in the middle of the third century B.C. was the ground in which, in spite of its scientific spirit, or perhaps engendered by it, empiricism and medical infidelity would readily spring up, and, gyrating in the void of positive knowledge, would, and did, give rise to weary and endless disputes and logomachies — *Federkriege*, as Susemihl calls them. Professing much reverence for Hippocrates, physicians broke loose not only from anatomy but also from the Hippocratic rational sagacity. In the third century B.C., as we learn from that earliest essay in medical criticism the Preface of Celsus, and from other sources, Philinus of Cos,* the reputed founder in Alexandria of the Empirical school, and Serapion, who harshly straightened it, instituted the schism in which walked with more or less discernment their eminent successors, such as Apollonius of Antioch, Herakleides of Tarentum (whom Soranus calls the most persuasive of them all), Menodotus, and Sextus Empiricus.

Towards the end of the second century B.C., under the evil rule of Ptolemy Physkon, Alexandrian science began to dwindle. Hipparchus, who had flourished about the middle of that century, was the last of the great originating minds. Then the disinterested search after knowledge for its own sake dropped into an industrious and respectable assiduity; as into the technical furtherance of the crafts, especially of agriculture. Accordingly, we find then the beginnings of those summaries and compilations which, admirable as they were in Varro and Celsus—two of the most scientific of the Romans—dogged the retreating footsteps of Urania. Thus the field was left open for astrological phantasies and for marvels of zoology which began to creep in from the East, and, flourishing in Aelian, spread themselves through the bestiaries and herbals of the Middle Ages.

After this introduction concerning the history of the pneumatist idea, it is convenient to illustrate its application to Medicine by some story of the chief medical teachers of the pneumatist school, so far as we know them. However far-reaching, even perennial, as was the pneumatic doctrine, I repeat that pneumatism, as a medical sect, was of brief duration; and for the most part its adherents are now no more than names to us. I propose, therefore, to speak more particularly of two only—of Athenaeus, the formal founder of this school in Rome, and Archigenes, who, if an Eclectic, came forth from the Pneumatist school.

ATHENAEUS.

Athenaeus was one of the most interesting of the Romano-Greek physicians; Diels, in his essay on the physical system of Straton, emphasizes the doxographical importance of Athenaeus, who nevertheless adopted and formed his opinions with critical judgement. As to his date, Athenaeus of Attalia, who, like most of the Roman physicians, emigrated thither from the colleges of the wealthy Hellenic cities of Asia Minor, was unknown to Celsus, who lived in the days of Tiberius and to whom Methodism was known; but his works were well known to Galen, who cites him frequently and in terms of much respect as an author and *savant*. We may assume, then, if perhaps he was born under Tiberius, that he flourished in the reign of Claudius. Athenaeus seems to have perceived how Methodism, in the sense of the atomic physiology, was even then withering; in practice it had dried up into two or three abstract maxims or common rules (κοινότητες); whilst its Epicurean philosophy was giving way in Rome to Stoicism. Thus intelligent men felt something more was wanted, and pneumatism, coming as it did in the tradition of the elder medicine—Sicilian, as we have seen, as well as Coan and Alexandrian—and in alliance with the ascendant stoicism, offered to fill the want. Athenaeus, therefore, had a large school or following in Rome. Indeed, pneumatism, as we have seen, represented a physiological idea of a kind so attractive that, under the phases of many schools, it survived in its essence until the eighteenth century. Athenaeus wrote a large and important work, Περὶ βοηθημάτων, which probably dealt with all departments of medicine. Unfortunately, this work has almost wholly perished; for what we know of Athenaeus we are dependent upon some fragments surviving in Oribasius, and upon some allusions by other authors. These relics suffice, however, to indicate that Athenaeus was a clear and accurate observer, apt in reflection and criticism, and wise in philosophy. To these gifts he added a large and various learning spiced with a shrewd irony. Athenaeus, like such later pneumatists, or eclectic pneumatists, as Herodotus, Archigenes, Leonides, Heliodorus, was a good surgeon. Moreover, the school was not clinical only. Besides its considerable therapeutical content, it taught also (as in the Π. βοηθημάτων) an elaborate physiology and pathology which, within my present limits, I may be able to illustrate by a few references, especially by its teaching concerning the pulse.†

Athenaeus, who did much to weld together philosophy and practical medicine, apportioned the sphere or faculty of medicine into five divisions. The first was physiology, which for him was the essential foundation; and therein he made a great advance upon the methodists and empirics. Of his next or second division, that of pathology, but little is known directly; yet we incur little error in interpreting the pathology of the master by that of his successor Archigenes. The main feature of his pathology, that upon which I would dwell for a moment, was the study of the causes of disease; for herein the school returned to the sounder tradition of Hippocrates, avoiding on the one hand the facile and jejune etiology of the Methodists and on the other the narrow concentration of the Empirics upon superficial and immediate antecedents. Of the logical classification of causes we read in Galen enough and to spare; and we of to-day in our array of causes are still somewhat given to outworn categories, such as the *predisposing*, the *exciting*, and so on. In Rome, from the time of Asclepiades, the sects which did not ignore the wider causes with moderation divided them into three classes at least, according to their nearness or remoteness in the series of antecedents. Thus Athenaeus did not expatiate in a wilderness of logical but unnatural categories. But the pneumatists conveniently distinguished αἰτία from διάθεσις, by which they signified all which pertains to the conditions of the disease in the individual. Disease (νόσος) was the dyscrasia; πάθος was used variably as the lesion or as the functional disarray, fever, for instance, as abstracted from symptoms of fever.‡ Συμπτώματα were the consequences of the dyscrasia. The dyscrasia, a perversion of health (eucrasia)—the ancients perceived in these rhetorical antitheses substantial as well as verbal values—was for the genuine pneumatist a failing or taint of the pneuma, and to be counteracted by marshalling against it the contrary quality—as cold against fever, and

* We have to regret our ignorance concerning this considerable person; almost all else we know is that he wrote glosses on his distinguished compatriot before Erotian. The Empirics boasted of an heretical descent from Akron of Agrigentum (fifth century B.C.), an eminent physician contemporary with Empedocles. It is not impossible that the hazy science of the Sicilian school may have instigated such a reaction, but we have no evidence of it.

† In what follows I am indebted especially to Daremberg's Oribasius and Rufus, Wellmann's article on "Philumenos," Hermes, 1903, and on "Ancient Medical History," Hermes, 1900, and continually, of course, to his "Essay on the Pneumatists." Nor must our general debt to Diels be forgotten.

‡ Herophilus pointed out that certain πάθοι might be natural (κατὰ φύσιν), such as childbirth or the secretion of milk; others unnatural (παρὰ φύσιν), such as fever. Still πάθος was often used in equivalence with νόσος, especially perhaps by the methodists (for example, ἡ παθητικὴ στέγνωσις, etc.).

so on; so that, as we shall see, physical means of cure prevailed with this school, such as diet adapted to the several seasons, clothing, exercises, waters, and so on. The fusion of their vitalistic pathology with the humoral, which for clearness' sake we are disregarding in this lecture,* was in its completion the task of Galen. By him the soul, or vital dynamic, in its three kinds—the natural, the animal, and the psychical soul—and the qualities of the elements were harmonized so far as logic could harmonize them; for instance, phlegm was akin to moisture, yellow bile to fire, black bile (spleen) to earth, and so on, the qualities being mixed in the blood. But it would be futile to enter farther into these logical permutations; I have said enough to give a notion of their method. It is, perhaps, more interesting to perceive how in certain ways Athenaeus and the pneumatists went back to Hippocrates. Thus I have touched upon their observation of climates and waters. The third pneumatist division was Dietetics; then came Materia Medica; and fifthly and lastly Therapeutics, a title with a larger content than is usual with us, and almost comprehending clinical practice.

Growth of Polypharmacy.

The vast commerce of the Ptolemies, and in some measure no doubt the lore of the Pharaonic Egypt, had flooded the markets of Alexandria with quantities of new drugs. One writes to a friend to send him good quality of drugs "lest he do otherwise and send him stale stuff which will not pass muster in Alexandria";† and the keen inquiry for them was far more than the legitimate demand of the medical practitioner. For with the treatise of Theophrastus *Περὶ τῶν δακετῶν καὶ βλητικῶν*, as one may approximately say, began the prodigious and diabolical literature on the art and mystery of poisons and antidotes in which, not always without the aid of medical accomplices, kings and nobles of the empire and its principalities, and after them popes and cardinals of the Church and their vassals, were the experts. And, indeed, the bent of the Herophileans, onward to Galen himself and the Galenists (Andreas, Krateuas, Apollonius Mys, Zopyrus), was to polypharmacy. In the decadence of Alexandrian science and society this gross or baleful propensity increased and multiplied; and under the influence of perfidious potentates, such as Mithridates,‡ Nicomedes, and Attalus, attained to an almost grotesque infamy. Under the foul accumulations of panaceas, mithridatics, and cosmetics, elaborated with a perverse and loathsome ingenuity,§ medicine was oppressed and almost suffocated; and the habit of heaping up ingredients degraded or defiled the legitimate prescriptions. Thus to build up a huge and conglomerate bolus or potion became the ambition of the doctor, and the faith and consolation of the patient. "If your liver is getting impatient," writes Juvenal in the XIIIth Satire, "seek Archigenes as fast as you can, and buy of him the composition of Mithridates, and you will live to eat figs and gather roses another year."

* We find the humoral pathology as far back as Herodotus, who tells how (IV, 187) the Lybian shepherds used to burn the veins on the vertex or temples of their children to prevent fluxions of rheum (*καταῤῥεον φλέγμα*).

† Milligan, Sel. Greek Papyri, 1910, p. 58.

‡ The locus classicus of this treacherous lore is the twenty-fifth chapter of Pliny (N.H.). Krateuas probably worked under the patronage of Mithridates (cf. new ed. by Wellmann, 1897).

§ Among many other such books see recently *Das Gift in der ..... antiken Literatur*. By Dr. Erich Harnack, of Halle. Leipzig, 1908. We note here that Archigenes sold the remedies himself.

The number of medical students in Italy shows a steady decrease from a total of 6,648 in 1899-1900 to 4,441 in 1908-9.

Lord Southwark, as President and Chairman of the South London Institute for the Blind Poor, appeals for funds for the support of that institution. A sum of £2,000, he says, is required immedia.ely. The honorary secretary is the Rev. St. Clare Hill; the offices are at 83, Borough Road, London, S.E.

An interesting instance of a marked family leaning towards medicine as a profession was recently brought to our notice by Dr. H. S. Royds of St. Mary Bourne, Hampshire. The name of the family is Baird, the head of it being a clergyman. No less than five of his children are members of the medical profession, two of them being medical women. Moreover, nearly all of them have taken not only degrees in medicine but also either in science or arts. The family is resident in New Zealand, but all its medical members received their medical education in Great Britain.

A BAD CASE OF STRANGULATED OMENTAL HERNIA, WITH VERY FEW SYMPTOMS.*

BY

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HONORARY SURGEON CARSHALTON AND DISTRICT HOSPITAL.

The following case is of interest in showing what a grave state of things can occur without the patient thinking much is the matter: A man of 60 years called to see me on Friday evening, February 25th. He complained of pain all over the lower abdomen like gripes, the pain was general, not tender near the appendix. He had been sick once, his tongue was clean, and his bowels open twice that day.

On Saturday, February 26th, he called to say he would like to go on his club, and went away again. On Sunday night his friends called to ask me to see him the next morning, but refused to let me go to him that night.

On Monday, February 28th, I called, and on looking at the abdomen at once saw a large swelling in the left inguinal region the size of my fist, solid and hard, tender and no impulse. It had been there all the time, and he only thought it was his old rupture down again, and would go back presently.

I told him that if he was not operated on without delay he would die, so he consented, and was removed to the hospital, and at 8 30 p.m. I cut down on the mass. It was indurated, and showed no landmarks. Presently a black mass came in view, and slitting up the cavity in which it lay I laid bare as much as three fingers of gangrenous omentum. Freeing the internal ring, and passing my finger into the abdomen, I felt a large hard mass extending as far as the middle line like a sausage. With difficulty freeing this I got it through the opening, and this was a mass of gangrenous omentum as big as my two fists. Having freed it all round, it was ligatured off close to the bowel; his left testicle and cord were removed. The wound was sewn up in three layers, and a big tube left to drain the abdomen; the operation took seventy-five minutes. He was put back to bed, and passed a good night.

On looking up my authorities I found very little on the subject, but was very surprised to read the following paragraph in Treves's *System of Surgery* for 1898:

> The existence of strangulated omental hernia attended by the usual strangulated symptoms was at one time questioned, but its reality has been placed beyond doubt.

It looks as though a strangulated pure omental hernia was rare.

Take the symptoms of strangulated hernia: irreducibility of the hernia; pain about the neck of the sac; sickness and faintness; pain in the abdomen, especially around the umbilicus, colicky in character; vomiting appears early; depression, cold sweats; temperature below normal; pulse rapid; constipation, and no flatus passed; subject to the usual variations.

Now, look at my case of to-day. A strangulated gangrenous omental hernia, pain in abdomen across the lower part; tenderness over hernia, which was hard, dull, and no impulse; temperature normal; pulse not affected; only sick once; bowels open even more than once a day; patient walking about three days out of the four.

And yet I think you will all agree that the man would not have lived very much longer unrelieved.

In Jacobson's and Stewart's *Operations in Surgery*, 1902, they quote Sir W. H. Bennett as describing a case of strangulated omental hernia with commencing gangrene—

> No interference with he action of the bowels; constipation and vomiting are both absent; but the symptoms which conclusively called for operation was the entire absence of real hernial impulse.

He does not mention the pulse and temperature, which in my case were unaffected.

One point is strongly brought out in my case, and that is, that when an omental hernia does get strangulated, it is certain to be fatal if unrelieved, *as the gangrene does not stop at the stricture, ut passes on into the abdomen.* He went out of hospital under four weeks without a truss. The case healed by primary union, and did well.

* Read before the Croydon Division of the South-Eastern Branch.

A very eminent London pathologist suggested that possibly the gangrene in this case started inside the abdomen high up on the omentum, and I suppose he was thinking of the style of cases described in Felix Lejars's excellent book on *Urgent Surgery*, 1909. Under the heading of "Torsion of Pedicles" he describes torsion of the great omentum with or without an irreducible hernia. In my case there was no twisted pedicle of omentum, and so I still contend that the gangrene started with the hernia becoming strangulated, *and that the gangrene in these cases is capable of passing along the omentum, past the stricture, to the inside of the abdomen, which is not the case as regards strangulated bowel.* I do not find any record of this surgical point in the textbooks.

A CASE OF TETANUS TREATED BY CHLORETONE.

By ROLAND A. HOBBS., M.R.C.S.Eng., L.R.C.P.Lond.'
HOUSE-SURGEON, ROYAL SURREY COUNTY HOSPITAL, GUILDFORD.

With a Note

By ERIC W. SHEAF, M.A., M.B., M.C.Cantab.,
HONORARY ASSISTANT SURGEON, ROYAL SURREY COUNTY HOSPITAL.

The treatment of tetanus is so very unsatisfactory that a case such as the one described below, in which the most dreaded symptoms of the disease were checked, is worthy of notice:

J. A., aged 46, a fishmonger, was admitted to this hospital under Dr. Mitchell, to whom I am indebted for permission to publish these notes. Dr. Sheaf also watched the case in consultation with Dr. Mitchell.

A nail projecting from his boot caused an abrasion on the plantar surface of his big toe on January 16th. Rigidity of his jaw developed on January 22nd—six days after the injury—and he was admitted to this hospital on January 25th with all the typical symptoms of tetanus except convulsions. The trismus was so advanced that the teeth could only be separated about ⅛ in.; there was marked abdominal rigidity and dysphagia, stiffness of the neck muscles, and slight retraction.

He was given 100 c.cm. of antitetanic serum, fomentations to both feet, as there were abrasions on each, and an injection per rectum of olive oil ℥ij containing chloretone 30 grains. This was followed by a marked decrease in the rigidity of the jaw; he swallowed much more easily and slept well.

For the next four days his condition remained on the whole satisfactory, although his temperature rose and reached 100.6° F.

During this period the following doses of chloretone were given, all per rectum, with olive oil.

January 26th, 40 grains, and repeated at night.
January 27th, 40 grains, and repeated at night.
January 28th, 120 grains, in three doses.
January 29th, 80 grains, in two doses.
January 30th, 30 grains, early in the morning and repeated.
100 c.cm. of antitetanic serum was injected on January 26th.

The chloretone was given when indicated by an increase in the rigidity.

A marked decrease in the trismus was constantly noticed after every dose of chloretone, the effect being observed at first as early as an hour after the administration of the drug, but later it took about two hours to make any marked difference.

On January 30th the throat was getting very full of mucus, which was improved by injections of atropine sulphate $\frac{1}{100}$ grain.

Towards the evening he became drowsy and passed into a very heavy and semicomatose condition, probably due to the effects of the chloretone combined with the severe constitutional disturbance resulting from the disease itself.

There were no special symptoms of poisoning, but his condition of stupor was somewhat alarming. The temperature now reached its maximum of 102.6° F. With the administration of oxygen and strychnine $\frac{1}{30}$ grain alternating every three hours with caffeine 1 grain hypodermically, and continuous saline per rectum, his condition gradually improved.

He was given another 100 c.cm. of antitetanic serum. The rigidity never became marked again, and beyond an antitoxin rash he had no untoward symptoms, and made a rapid recovery, leaving the hospital for the convalescent home fairly strong, having been in just under six weeks.

The total amount of antitetanic serum and chloretone given was: Serum, 390 c.cm.; chloretone, 420 grains.

To summarize, the points to be specially noted are:

1. The early onset of symptoms and consequent grave prognosis.
2. A marked decrease in the rigidity was noted a definite period after the administration of chloretone, the trismus being relieved in a constant and remarkable manner.
3. The complete absence of convulsions from beginning to end of the illness.
4. The relief of trismus enabled the patient to take ample nourishment throughout and thus maintain his strength.
5. The rapid recovery of the case.

I am firmly convinced that this man's life was saved by chloretone, although the part played by the antitetanic serum must not be disregarded.

Note by Dr. Sheaf.

Tetanus kills partly by the direct action of the toxin and partly by the exhausting effects of the convulsions.

By the trismus, and dread that taking food will bring on a convulsion, starvation is added to the horrors of the disease and sleep is prevented by the painful muscular contraction.

In treating the disease there are therefore the following indications:

1. To prevent further absorption of tissue.
2. To neutralize the circulating toxin, for it is at present impossible to affect the toxin which has already combined with the nerve cells.
3. To relax the muscles and prevent the tetanic spasms.

If this last can be accomplished the patient will escape the exhaustion and be able to take food and to sleep. Consequently he will be in the best position to fight the disease.

To this end many drugs have been used with more or less success, and of these magnesium sulphate has recently found most favour.

Dr. C. T. McClintock and Dr. W. H. Hutchings, of Detroit, Michigan, U.S.A., undertook an experimental study of the various drugs used for this purpose, and were convinced that chloretone was the best substance hitherto employed.

Subsequently Dr. Hutchings published 6 cases treated with chloretone, with 4 recoveries.[1]

Of the 2 cases that died, one succumbed on the eleventh day of peritonitis, having been free from tetanus symptoms for several days; the other was a very severe case, symptoms appearing four days after injury.

In the next case treatment with chloretone was begun; the convulsions were only partially controlled at first, later complete relaxation was obtained, but he died of circulatory failure.

Dr. Hutchings points out that in animal experiments chloretone poisoning killed by respiratory failure, and that therefore his last case died of tetanus and not of chloretone poisoning. For the same reason I do not think that the serious symptoms on January 30th in our case were due so much to the chloretone as to the disease itself.

These results and the result in the case reported above are very satisfactory. Chloretone has the advantage over the intraspinous injection of magnesium sulphate in its greater safety, and from these cases its therapeutic action seems to be equally satisfactory.

Reference.
[1] *Surgery, Gynaecology, and Obstetrics*, July, 1909.

An examination of candidates for not fewer than fifteen commissions in the Royal Army Medical Corps will be held on January 25th next and following days. Applications to compete should be made to the Secretary, War Office, London, S.W., not later than January 16th next, on which date the list will be closed. The presence of candidates will be required in London from January 23rd.

Alvarenga Prize.—The College of Physicians of Philadelphia announces that the next award of the Alvarenga Prize, being the income for one year of the bequest of the late Senor Alvarenga, and amounting to about 180 dollars, will be made on July 14th, 1911, provided that an essay deemed by the Committee of Award to be worthy of the prize shall have been offered. Essays, which may be upon any subject in medicine, must be typewritten, and must be received by the Secretary of the College on or before May 1st, 1911. The Alvarenga Prize for 1910 has been awarded to Dr. M. Katzenstein, of Berlin, for his essay entitled, The Formation of an Arterial Collateral Circulation in the Kidney.

SEVENTY-EIGHTH ANNUAL MEETING
OF THE
British Medical Association.

Held in London on July 22nd, 23rd, 25th, 26th, 27th, 28th, and 29th.

PROCEEDINGS OF SECTIONS.

SECTION OF PATHOLOGY.

S. G. Shattock, F.R.C.S., President.

PRESIDENT'S INTRODUCTORY REMARKS.

After a few initial observations, Mr. Shattock said: Some pathological or clinico-pathological questions are particularly well adapted to the observation of the practitioner. His position is peculiar, amongst other ways, in his intimate and long-extended knowledge of the medical history of the members of particular families. And not the least important of the many functions of the Journal of the Association is the ready means it affords the practitioner of recording observations, which the specialist may afterwards garner for more general purposes. But he might be encouraged to contribute in the future more extensively to these meetings.

Speaking at random, some such subjects on which he might furnish information would be:

1. The ultimate results of double castration or of double oöphorectomy in adults upon the external sexual characters—a matter of considerable biological interest.

2. The proclivity of the bones to fractures in the members of certain families.

It has often seemed to me there may be differences in the hardness of bone due to slight deviations in the relative proportions of its earthy salts—somewhat in the way that minute differences in the proportion of carbon affect the tenacity of steel—chemical malformations, as Garrod would call them.

3. The history, *quâ* alcohol, of persons reaching 85 and upwards and a critical investigation of their mental powers is another kind of observation easy to make in general practice. A record of fifty such would be a contribution to the alcohol question.

4. The possibility of uterine or tubal tuberculosis being directly derived from the tuberculous emission of the male is another matter upon which evidence would be valuable.

5. In regard to the important subject of cancer, there is its possible contagiousness and infectiousness, using these terms in the usual clinical sense.

Mr. Butlin, in his address in surgery two years ago, produced a series of striking instances of autoinoculation. But any evidence as to the communication of the disease from one individual to another is still worth searching for and recording. The vitality of the cancer cell, as it is studied in mouse cancer, is one of the surprising things in biology. The carcinomatous tissue may be kept for three weeks in an ice-chest, and still be successfully implanted into further mice; and even after its treatment with liquid air a certain number of mice may be grafted from it. These observations naturally strengthen the theoretical possibility of cancer, in the human subject, being conveyed from one individual to another, and favour the belief suggested by cancer houses, cancer villages, and cancer districts. But there is one common agency which the cancer cell cannot withstand, and that is simple drying. Dr. Dudgeon and I have confirmed, by work we have had the privilege of carrying out in connexion with the Imperial Cancer Research, the fact that the drying of cancer pulp in thin layers at the body temperature so completely kills the cells that no further grafts can be raised by means of the material after it has been remade into a pulp with salt solution.

This fact vastly reduces the possible infectiousness of carcinomatous débris expectorated or otherwise discharged by cancer patients. The case becomes at once altogether different from that of a tuberculous or other bacillary infection, where the drying of the bacilli is by no means immediately lethal. Dr. Dudgeon and I are further testing the possible conveyance of mouse cancer by means of spraying the unkilled cells, suspended in salt solution, into the air inhaled by mice.

Were cancer ever an airborne disease, however, primary carcinoma of the lung should be something not uncommon. But its extreme rarity proves that such a contraction of the disease could at the most be merely a curiosity and devoid of any great practical issues. The proclivity of the larynx to carcinoma can be explained without recourse to an airborne theory.

And, lastly, for the practitioner interested in the Mendelian aspect of evolution, the construction of medical pedigrees is, as Brevet-Colonel Firth has pointed out, a piece of work that would be of real value. The problems which concern the heredity of such diseases as gout, cystinuria, alkaptonuria, tuberculosis, cancer, and insanity can only be elucidated by the study of critically collected histories obtained in individual families.

THE NERVOUS SYSTEM IN CHRONIC ALCOHOLISM.

(With Special Plate.)

By F. W. Mott, M.D., F.R.S., F.R.C.P.,
Physician to Charing Cross Hospital and Pathologist to the London County Asylums.

I.

As physician to a large general hospital situated in the middle of the liquor traffic and as Pathologist to the London County Asylums, I have had unusual opportunities of studying the effects of alcohol upon the sane and well fed and the sane and ill fed, as well as upon the insane and potentially insane well fed and ill fed. It is only by a comparative study of the individual that a true estimate of the effects of alcohol upon the nervous system can be properly gauged, and it is desirable to approach the subject in a scientific spirit and without prejudice.

The effects of alcohol are largely dependent upon not only the quantity and quality of the liquor taken and the period of time over which it has been taken, but upon the personality of the individual, and by the personality of the individual I mean the physical and mental characteristics which differentiate him from every other individual.

I will illustrate this point first by showing the photographs of a number of chronic inebriates who are sent to reformatories. I will call your attention to the striking evidence in the physiognomies of these people indicative of feeble-mindedness, and I will correlate this fact with an extract from the report of Dr. Branthwaite for the year 1905, concerning Certified Inebriate Reformatories established under the Inebriates Act, 1879–1900. At page 10, he remarks:

> Upwards of 62 per cent. of the persons committed to reformatories under the Act are found to be insane or defective in varying degree. I am satisfied that the majority of our insane inebriates have become alcoholic because of congenital defects or tendency to insanity, not insane as a result of alcoholism, and that the drunkenness which preceded alcoholic insanity was merely the herald—the only obvious sign—of incipient mental disorder. In relation to the final insanity, drunkenness in such cases is the intensifier, perhaps, but not the cause of the disease. These chronic alcoholics who eventually come under the care of the State may be divided into two classes: (*a*) Degenerates, imbeciles, and epileptics; (*b*) moral and social defectives.
>
> A marked intolerance to the action of alcohol is present in both the refractory and quiet class of defectives; very small quantities of drink, no more than is taken daily without apparent physiological effect by an ordinary individual, being sufficient to cause disorderly and violent behaviour. Our experience in this direction has led us to accept the view that intolerance of the exciting effects of small quantities of alcohol may be considered a fairly certain sign of impaired mental equilibrium.

I have long been struck by the fact that whereas cirrhosis of the liver with ascites is relatively common in the wards and *post-mortem* room of the hospital, I have only once seen a case of advanced cirrhosis *with ascites* in the asylums, and that was in the case of a notorious police-court character who was convicted of drunkenness nearly 400 times before she was found incapable of taking care of herself and certified as insane. I have come to the conclusion that the effects of alcohol upon the mind depend not only upon the quantity, quality, and period of time alcohol has been taken, but even more upon the personality

of the individual—his temperament, organic constitution, and the circumstances which led to intemperance, especially poverty, insufficient food, and miserable surroundings. It is probable that a person who can drink to a condition of advanced cirrhosis of the liver has inherited an inborn stable mental organization.

In discussing the question of alcohol and insanity we have to consider whether alcohol is the efficient cause of the mental disease, a coefficient with other bodily and mental causes, or merely a coincidence. If we compare the statistics of hospital and asylum *post-mortem* examinations, we are struck with the fact that in the former there are a large number of cases of advanced cirrhosis of the liver, whereas in the latter there are relatively few cases of cirrhosis, and many of those recognizable with difficulty. I will throw on the screen a statistical analysis, prepared for me by my assistant, Dr. J. P. Candler, of the results obtained in 1,099 autopsies on adults at Charing Cross Hospital, compared with the 1,271 *post-mortem* examinations at Claybury Asylum. An analysis of the results obtained by Drs. Rolleston and Fenton on *post-mortem* records extending over ten years at St. George's Hospital is given, and in the main it supports the opinion that the statisics derived from Charitng Cross Hospital agree with those which could be obtained at other London hospitals.

The principal points of interest which this tabular synopsis of a comparative inquiry into the *post-mortem* incidence of cirrhosis of the liver at Charing Cross Hospital and Claybury Asylum afford in relation to the subject of alcohol and insanity may be summarized thus:

At Charing Cross Hospital the notes of the autopsies upon 1,099 adult cases were examined—735 males and 364 females. Out of this number there were 85, or 7.7 per cent., cases of cirrhosis of the liver, which accords closely with the 8 per cent. in which alcohol was the immediate and direct cause of the disease for which the patients were admitted to the hospital. The per centage of males is 9.1 and the females 4.9. In Claybury Asylum the notes of 1,271 autopsies were investigated (627 males and 644 females). Of this number only 23 cases of hepatic cirrhosis were found (14 males and 9 females). The total percentage of cirrhosis of the liver works out at 1.8 per cent. (males 2.2 per cent. and females 1.3 per cent.). There are a number of points of interest to which the synopsis refers, but I will limit my remarks thereon to the following more important facts which have been elucidated—namely, that only 1 case of cirrhosis with ascites occurred at Claybury Asylum, whereas of the Charing Cross Hospital cirrhosis cases 66.6 per cent. had ascites, 22.2 per cent. with a history of paracentesis abdominis. At Claybury, in 1 instance of the 23 cases was cirrhosis of the liver mentioned as the assigned cause of death, whereas at the hospital in 72.2 per cent. of the 85 cases cirrhosis of the liver was the assigned cause of death. It was noteworthy that the cases of well marked cirrhosis met with on the *post-mortem* table at the asylum were large livers, and they occurred in persons who had a well marked history of chronic alcoholism, and who during life presented physical signs and mental symptoms of chronic alcoholic insanity, notably alcoholic dementia and polyneuritic psychosis (Korsakow). There were, in addition, some cases of general paralysis. The relatively greater frequency with which acute and chronic gastritis and other inflammatory lesions of the stomach are met with in cases of alcoholic affections of the liver among the insane is shown.

There is a greater frequency of arterio-sclerotic changes associated with cirrhosis of the liver in the case of the insane, especially among the males. Atheroma of the aorta is common on the *post-mortem* table, even in comparatively young people, in asylums. Probably this may be explained by the fact that a large proportion of the deaths occur in the subjects of general paralysis, and this is in all probability due to the syphilitic origin of the disease.

It may be remarked that in only four of the fatal cases occurring at the hospital neuritic symptoms were associated. In fact, it is noteworthy that alcoholic cirrhosis of the liver with pronounced ascites and a history of prolonged intemperance, even excessive intemperance, frequently occurs in individuals who may exhibit no obvious mental symptoms beyond a weakened will, and loss of moral sense shown by the indulgence of a vicious habit.

Comparative statistics of alcohol as a cause of insanity in patients admitted to the London County Asylums for the last thirteen years show an amount of variability of percentages in the same asylum for different years, and in different asylums for the same year (although the admissions are drawn from the same class of the population), that can be in great part explained by a difference of opinion by medical officers as to what constitutes evidence of alcoholic excess and interest in ascertaining a complete family history. Not only have we, however, to take into consideration the personal equation of the medical officers who obtain the information, but also of the friends who give it, as to what constitutes alcoholic excess and as to how far alcoholism is an efficient cause. The statistics which I place upon the screen derived from the annual reports of the Asylums Committee illustrate these facts. In one year, 1902, from the same class of people, alcohol is the assigned cause of 25.6 per cent. of the admissions to Hanwell, and to Claybury 11.2 per cent.; but in 1906, intemperance is the assigned cause of 28 per cent. of the admissions to Claybury, while at Colney Hatch it is only 14 per cent. At Bexley Asylum, where they have adopted the modern classification and where the statistics appear to be nearly uniform since its opening, intemperance as an assigned cause is very high, the average being 22.8 per cent. for the seven years. An analysis of the cases admitted during 1905 to this asylum in which intemperance was either a coefficient or efficient cause in 25.7 per cent. of the total admissions, shows that there are many cases in which other causes are associated. Of 248 male admissions, alcoholic excess was the assigned principal cause in 46, or 18.5 per cent., and out of the 246 female admissions alcoholic excess was the principal cause

DESCRIPTION OF SPECIAL PLATE.

Fig. 1.—Section of normal cortex from ascending frontal convolution, to show the wealth of fibres (*a*) tangential, (*b*) super-radial, (*c*) inter-radial association systems; the latter intersects at right angles the radial fibres. Magnification 30.

Fig. 3.—The same section of normal cortex more highly magnified, showing (*a*) the tangential, (*b*) super-radial, (*c*) inter-radial association systems. Magnification 80.

Fig. 2.—Section of cortex from ascending frontal convolution of a case of chronic persistent alcoholic dementia. No improvement occurred in her demented state, although no alcohol was obtained for several years. Compared with Fig. 1 it will be observed that there is great diminution in the wealth of fibres, especially of the association systems. Magnification 30.

Fig. 4.—The same section as Fig. 2, more highly magnified. Compared with Fig. 3, it will be observed that there is a disappearance of the tangential and super-radial systems. Magnification 80. These sections were stained by Weigert-Pal methods.

Fig. 5.—Section of prefrontal cortex from another case of chronic alcoholic dementia; there was a history of 15 years' inebriety, and evidence of advanced cirrhosis of the liver (without ascites), vide Fig. 7; it will be observed that the cells are fairly normal in the pyramidal layer, but there is atrophy and disappearance of the tangential and super-radial systems of fibres. Magnification 80 diameters.

Fig. 6.—Section of ascending frontal convolution, for comparison with Fig. 5; observe that there are tangential and super-radial fibres, although there is some degree of atrophy and evidences of active degeneration by the existence of varicosities on the fibres of the tangential system. Magnification 80. These sections were stained by Weigert-Pal and counterstained with eosin to show the cells.

Fig. 7.—Liver showing advanced cirrhosis; the nodular appearance of the surface of the organ is well seen. Magnification 80.

Fig. 8.—Small Betz psycho-motor cell, from the ascending frontal convolution of a case of chronic alcoholic dementia, showing eccentric nucleus and perinuclear chromatolysis. Magnification 350.

Fig. 9.—Cells of the vagus nucleus in which degeneration of the vagus nerve was found; from a case of polyneuritic psychosis, acute fatty degeneration of the heart and encephalitis haemorrhagica. Magnification 350.

Fig. 10.—Section of cortex of a rapidly fatal case of polyneuritic psychosis with encephalitis haemorrhagica. There is atrophy of the association systems, for the section was stained by the Weigert method to display the fibres. The black irregular patches are haemorrhages in the cortex. These were visible throughout the central cortex, and varied in size from a pin point to a large pin's head. They are caused by the rupture of small vessels which were in a state of chronic inflammation and fatty degeneration. Magnification 80.

TO ILLUSTRATE DR. F. W. MOTT'S PAPER ON THE NERVOUS SYSTEM IN CHRONIC ALCOHOLISM.

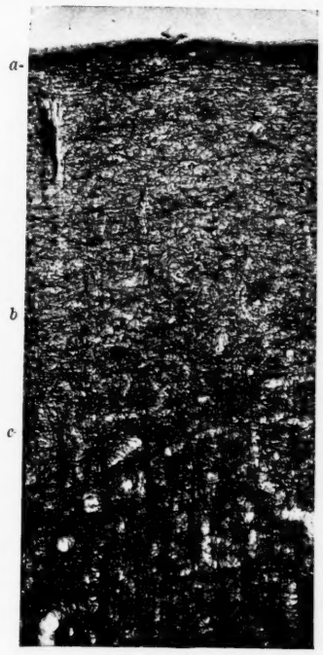

Fig. 3.

Fig. 4.

Fig. 1.

Fig. 2.

Fig. 6.

Fig. 5.

Fig. 10.

Fig. 8

Fig. 7.

Fig. 9.

in 38, or 15.4 per cent., a total percentage on the whole admissions of 17 per cent. But when we inquire into these cases we find that 13 were imbeciles, 13 were epileptics, 5 were cases of chronic delusional insanity, 5 were organic dementia, and no less than 20 were cases of primary dementia. In fact, out of the 84 cases, quite one half were lunatics or potential lunatics and the subjects of an inborn tendency to mental disease. I will put on the screen a statistical table to illustrate this. My experience at Hanwell, Claybury, and other asylums corroborates this statement. Moreover, I have found that the notes show hereditary insanity or epilepsy quite as frequently in these so-called alcoholic cases as in other forms of insanity, and more frequently than in general paralysis. In the family histories of these cases of insanity as a result of intemperance we find frequently neurosis, criminal degeneracy, insanity, and chronic alcoholism in the pedigrees on one or both. In the personal histories, inherent instability is frequently found in the form of neuropathies, imbecility, criminal degeneracy, epilepsy, and intolerance of alcohol, as manifested by previous admissions, when they were termed recurrent mania and recurrent melancholia. Some of these cases are manic depressive insanity. Sometimes there is a head injury, brain disease, and not infrequently incipient general paralysis. Many are admitted on account of threatened or attempted suicide, and a few on account of murderous assaults and sexual crimes.

Coincidence and cause may thus be confused, for a lapse from moderation into intemperance may be the first recognizable sign of the mental breakdown. Especially is this the case with general paralysis, and the involutional psychoses occurring in the climacteric period in women, also men between 50 and 60 who suffer with melancholia, and at the same time are often the subjects of arteriosclerosis. Again, cases of periodic or manic depressive insanity and dementia praecox may take to drink. There can be no doubt that neurasthenics, epileptics, imbeciles, degenerates, and potential lunatics possess a marked intolerance to alcohol, and the failure to discriminate between what is *heredity* and what is the *result of alcoholism* has been the cause of much confusion.

Many cases of chronic alcoholism seen in hospital practice are persons who have drunk a large quantity of alcohol every day for a number of years and finally die, after many operations of paracentesis abdominis, from advanced cirrhosis and ascites. They do not, as a rule, show signs of mental derangement beyond a weakened will power, failing memory, and an unnatural craving for indulgence of a vicious habit. There may, however, be a history of their having suffered from an attack of delirium tremens on one or more occasions, from which they have recovered, and I agree with Sullivan that some affection of the mind is the usual result of chronic alcoholism, but it is commonly moderate in degree or, if more intense, is so transitory in duration that it does not bring the drinker, as a rule, within the walls of an asylum, unless suicide is attempted. We might on this account regard delirium tremens as an exacerbation of a mild chronic alcoholic psychosis. In connexion with the problem of causal relationship of alcoholism to certifiable insanity, it is of interest to note that Drs. Sullivan, Bevan Lewis, and MacDonald have brought forward arguments that alcohol, as an efficient cause of insanity, is not so great as the reports of the Lunacy Commissioners in England would indicate. Drs. Bevan Lewis and Macdonald have shown a regional dissociation between alcohol and insanity. Thus inland and agricultural communities had the least inebriate but highest ratio of pauperism and insanity. Maritime, mining, and manufacturing communities, above all others, were the most intemperate, but revealed the lowest ratios of pauperism and insanity. Dr. Sullivan, by careful analysis and tables, has shown that in the regional distribution of insanity it is difficult to trace any evidence of alcoholic influence such as might be expected if alcoholism really accounted for one-sixth of the total number of cases. Thus Lancashire, Warwick, and Cheshire, which rank very high in the scale of alcoholism, and the mining counties, where drunkenness is rife, are alike in showing very low rates of insanity. He concludes that alcohol as the essential cause of certified insanity falls a good deal short of 16 per cent., at which it is rated in the official statistics, and may be something under 10 per cent. There is, however, a reason that agricultural communities in England should have higher percentages of insane: it is on account of the migration of the mentally and physically capable men and women to the industrial centres, leaving the feeble in mind and body behind to procreate their species; and this at the present time is a matter of national importance. While the drink bill is annually falling, the percentage of insanity in the population is rising.*

If alcohol is not responsible for certified insanity to the extent that is generally believed, there can be no doubt that it is the most fruitful cause of pauperism and crime. Sullivan asserts that 60 per cent. of the crimes of violence are due to drink.

The psychoses which occur in the subjects of chronic alcoholism may be divided into three groups:

1. Mental affections which are the result of the direct or indirect action of alcohol upon usually a previously healthy brain for a considerable period of time—that is, delirium tremens and polyneuritic psychosis (Korsakow's disease).

2. Mental affections resulting from alcoholism occurring in an individual who is either potentially insane or possesses a morbid temperament. At least, this is the explanation I should offer, because the cases in many respects are hardly distinguishable from typical insanity of abstainers.

3. Cases in which groups 1 and 2 are more or less combined.

It is difficult to decide simply by the hallucinations and delusions alone whether alcohol is the cause. Should these, however, persist, especially auditory hallucinations while the mind otherwise is clear, it is probable that alcohol has only acted as a coefficient; consequently it is difficult to differentiate such cases from paranoia or hallucinatory insanity occurring in non-drinkers; moreover, the chronic forms may begin insidiously, or by an acute onset in both drinkers and abstainers.

Certain signs and symptoms point to alcohol being the efficient cause, namely, the existence of physical signs and symptoms pointing to its following on an attack of delirium tremens; the existence of physical signs and symptoms pointing to visceral disease, especially enlarged liver; and the evidence of neuritis associated with any of the characteristic mental symptoms of Korsakow's syndrome. Besides, there are certain mental symptoms which afford strong presumptive evidence that alcohol is an efficient cause, and not merely a coefficient or coincident, namely, morbid jealousy and suspicions relating to the sexual functions and reproductive organs, marital relations and maternal instincts; threatening or terrifying visual and auditory hallucinations accompanied by delusions of being followed by policemen and detectives; also delusions connected with the deranged cutaneous and kinaesthetic sensibility caused by neuritis. Delusions of poisoning are not uncommon, and these may be the result of an insane interpretation of the pains incidental to gastritis. In most of the cases of psychosis occurring in patients the subjects of chronic alcoholism morbid states of depression predominate and persist, causing morbid fears, anxiety, and tendency to suicide; in some cases there is persistent exaltation, and even grandiose delusions, usually associated with some signs and symptoms of polyneuritic psychosis. They give rise to a pseudo-general paralysis. The morbid changes in the brain, however, differ from those of general paralysis. The more the cases exhibit during life signs and symptoms (conforming to the cases met with in hospital practice) of delirium tremens and polyneuritic psychosis, the more likely is there to be a well marked cirrhosis of the liver.

It might be argued that the progressive and continuous poisoning of the body with alcohol leads to permanent changes in the organs, and induces thereby permanent disturbances of metabolism and autotoxaemia which will induce chronic psychoses. At present no reliable evidence is forthcoming that there is a deranged metabolism in these cases of alcoholic hallucinosis and alcoholic paranoia. The gastritis and the advanced cirrhotic condition of the liver which may occur in hospital cases, and in which one would expect, therefore, a deranged

* Although we see placarded by the *Daily News*, "How the Budge has made the people sober," thinking people will attribute the diminished consumption of alcohol to education of the national conscience to temperance; and by temperance I mean moderation, which, starting in the better classes, is pervading all classes. The establishment of healthy recreation, clean dwellings for the poor, and cheap, clean, and wholesome cafés, has done more in the cause of reform than prohibitive legal measures in the cause of temperance.

metabolism, do not support this view, but rather we should explain a chronic delusional insanity occurring after alcohol as the result of the effect of the poison upon a subject potentially insane, and who might have developed it if alcohol had not been taken. Before we can solve this question, however, it is necessary to have an accurate comparison, clinical as well as pathological, of all the acute and chronic cases of hallucinosis and paranoia in drinkers and abstainers. This might enable us to separate the one from the other. We might ascertain, moreover, that many of the cases which are termed "chronic alcoholic psychoses" are not really alcoholic in origin. Another point which, to my mind, requires an investigation, is whether cases of acute hallucinosis occur especially in the subjects of chronic alcoholism, or whether a considerable number develop, as I believe, soon after the individual has commenced drinking. I would also suggest the desirability of a complete inquiry into the family history of the different types in order to ascertain the sum total of inherited degenerative tendencies.

Dipsomania is a form of periodic insanity. There are persons who have periodic cravings for alcohol, who in the intervals lead a sober, respectable life. Suddenly, and often for no accountable reason save an unnatural and insane craving for drink, dipsomaniacs neglect their home and their business, take little food, do not attend to their personal care or comfort, and drinking continuously to satisfy their morbid craving sink into the lowest depths of moral degradation, and for a time lead an unnatural and vagabond life.

In conclusion I would sum up as follows:

The fact that but few cases of advanced cirrhosis of the liver are found in the asylums, and that these occur in cases either of general paralysis, alcoholic dementia, or Korsakow's disease, both of which latter only occur after prolonged intemperance, suggests, *a priori*, that in the great majority of cases of alcoholic insanity alcohol acts as a coefficient to some other factors peculiar to the individual. This hypothesis is supported: (1) By the relatively large number of cases of advanced cirrhosis of the liver dying in the hospitals and presenting no mental symptoms. (2) By the variability of percentages of alcohol as a cause of insanity in the different London asylums as shown by statistics extending over thirteen years. (3) By the regional dissociation of drunkenness and insanity as shown by comparison of maritime and manufacturing communities with rural communities, this being explicable by the mental and psychical deterioration of the agricultural population in England owing to the migration of the better types to the industrial centres.

The polyneuritic psychosis, or Korsakow's disease, was at one time thought to be due to alcohol directly acting on the brain cells. A typical instance of this disease rarely occurs in any other condition than alcoholism; it accompanies the later stages of alcoholism, and is allied to delirium tremens. It is more prone to occur in individuals with inborn sane mental inheritance than in insane.

The pathogenesis is obscure. The disease, however, is not due to the direct action of alcohol on nervous structures. More probably it is due to deranged metabolism, secondary microbial toxaemia, and autotoxaemia from deranged organs which have been injured by the poisonous effects of the alcohol ingested.

Other causes of this disease are influenza, pulmonary tuberculosis, septic infection, diabetes, and chronic poisoning by some of the metallic poisons, such as arsenic, lead, and mercury.

Dupré states that he has known the disease to be caused by mercurial poisoning in the treatment of syphilis.

This disease occurs more frequently in women than in men, and usually in adult life. An excellent study of it has been made by Ascherson,* who states: There are four symptoms which take precedence of all others in importance.

These are:

1. Loss of memory.
2. Paramnesia or pseudo-reminiscence.
3. Mental confusion.
4. Certain peculiarities of the mood.

The loss of memory is for recent events; generally the patients remember the general circumstances of their past, while they forget those which have occurred more recently. The period of time in the immediate past for the circumstances of which the memory is defective varies in individual cases, but usually coincides with that of the patient's illness.

So far the amnesia is anterograde, and concerns a period during which not only the power of recollection may have been at fault, but when, by reason of an impaired power of attention, the material for recollection was probably lacking. In many cases the patients also fail to recollect those circumstances which occurred within a period of time antecedent to the onset of their disease; the amnesia is retrograde, and, in this case, since the attention before the disease set in was presumably normal, must depend upon a defective power of recollection alone. Clinical observation shows also that the defect of memory is active—that is to say, that facts continue to be forgotten in measure as they are acquired.

French writers have given the name "*amnésie continue*" to this kind of defect of memory; it is an important feature of Korsakow's disease, and is often present in cases in which the memory is otherwise unaffected. This continual failure of recollection affects all recent acquisitions; not only do the patients fail to reproduce ordinary test words and combinations of figures, but they entirely forget the faces they have just seen and the actions of everyday life they have just performed.

Paramnesia (pseudo-reminiscence, false memory), or the representation before consciousness of false experience, is an essential feature of Korsakow's disease. I have rarely seen an instance of the disease in which it was absent. This symptom has been carefully studied by Korsakow, and has formed the exclusive subject of one of his monographs. Professors Kraepelin and Wehrung have also attempted to explain it psychologically.

Mental Confusion.—A varying degree of mental confusion is always a symptom at some stage of the malady. In some cases it amounts to positive incoherence, and is then so prominent a feature as to overshadow completely the disturbance of memory. Such cases were recognized by Korsakow, who spoke of the patient's condition as *Apathische Verwirrheit*, and they constitute also the *forme confusionelle* of the French writers. Very often the disturbance of the ideation is limited to a disorientation in time and place, with, perhaps, confusion of identity of persons. These isolated symptoms, and, in fact, mental confusion in general, seem to me to denote a condition of partial stupor.

The Mood of the Patients.—Unless frequent attempts are made to hold their attention the patients are more or less oblivious to surrounding circumstances, and this occasions the condition of apathy to which their dull and listless facial expression bears witness. When roused they are apt to be extremely irritable, and this I attribute in part to the recognition of their confused state of mind, although it is no doubt due to some extent to the instability of the emotions.

In severe cases the patient may develop a stuporose dementia and pass urine and faeces in the bed. Some patients are inclined to be jocular, and I look upon this as a favourable symptom. It is a feature of the mental state of alcoholics in general, and is the more striking because of the misery with which these patients are so often afflicted.

"Bevan Lewis has remarked upon the rude and impulsive conduct of the patients. While such conduct may be in part an instance of moral degradation, it has in my opinion a deeper significance. Rudeness and impulsiveness is very often found in epilepsy and dementia praecox; with imitativeness, attitudinizing, echolalia, the use of neologisms, and the other forms of automatism, it is an instance of katatonia, or the undue expression of low forms of mental activity insufficiently controlled by the higher mental faculties, and is but another instance of an incomplete state of the consciousness. The patients are often emotional, but their emotionalism is never profound, and the same may be said of their moods of depression. In fact, their mood continually alters, and, indeed, must be regarded as part of a dream state rather than as a part of their true nature; in further proof of this is their increased excitability at night, at a time when further removal of consciousness by approaching sleep gives freer sway to delirium."

Visual hallucinations are more common than aural hallucinations in these cases, which is the reverse of what occurs in cases of acute alcoholic insanity, where the latter are more usual. This is important from the point of view of etiology, since visual hallucinations are the kind most often found in the delirium of acute specific fevers and in the toxic insanities. Delusions of jealousy and morbid ideas of persecution are also present in some of these cases, also delusions of a sexual character and delusions of grandeur.

The delusions, whatever their nature may be, are rarely systematized, and, unlike the acute forms of alcoholic mental affections, Korsakow's disease does not often lead to chronic delusional insanity.

* The Mental State in Alcoholism, *Archives of Neurology*, vol. iii.

Physical Symptoms.

The most important physical symptoms are multiple neuritis, and the neuritis is one of the entire nervous system; the nerves of the lower extremities are most often affected, but the upper limbs—especially where occupation leads to their continuous use—are not infrequently affected in some cases. I have seen the face and even the muscles partially paralysed or paretic, and in two fatal cases of heart failure and fatty degeneration, the vagus nerves and their medullary nuclei (vide Fig. 9) were the seat of characteristic changes. As a result of the neuritis there is paralysis, wasting of muscles, absence of deep reflexes and more or less reaction of degeneration. The superficial and deep sensory nerves are usually affected; probably the tenderness on deep pressure is due to the chronic inflammatory affection of the deep sensory nerves to muscle. The affection of the skin sensory nerves is shown clinically by severe pains; in one case the patient believed she was on fire and rushed to the window, and would have jumped out had she not been prevented. The next day bullae appeared on the skin of the legs, and subsequent examination of the nerves to these bullae of the skin showed marked evidences of recent acute degeneration by the Marchi method. Besides hyperaesthesia there may be numbness and formication. There is usually in severe cases a stocking and gauntlet anaesthesia and analgesia which, if marked and persistent, is accompanied by glossy skin.

Various deformities and contractures are liable to occur in the limbs from the effects of the disease, and permanent foot-drop results, the liability to which is increased by the continued effect of the weight of the bedclothes pressing upon the feet.* Tremor is present and sometimes ptosis, and amongst general symptoms may be mentioned debility, emaciation, anaemia, headache, vomiting, and diarrhoea. These symptoms may be serious, and show a general deterioration of the organs and their functions.

II.

The following is a histological account of the structural changes in Korsakow's disease:

The brains are generally of good weight, of good convolutional pattern, and do not, as a rule, show much evidence of thickening of the pia-arachnoid membranes, increase of cerebro-spinal fluid, or other obvious signs of cerebral wasting. The ventricles are not granular, but there may be a few ependymal granulations in the lateral sacs of the fourth ventricle. Microscopical examination shows some wasting of the tangential fibres and subpial glia cell proliferation and felting, but, as a rule, this is not marked. The fibre systems as a general rule are otherwise well preserved. There is no very marked glia cell proliferation in the cortex, and when sections are stained by the Nissl method, the cells of the columns of Meynert are not distorted or poorly stained, their apical processes are not corkscrewed, and there is no marked coarse change of the cortical neurones as in general paralysis. There is no lymphocyte and plasma cell infiltration of the membranes and perivascular sheaths.

Are there any morbid microscopic changes pathognomonic of toxic polyneuritic psychosis? In my opinion this clinical syndrome is not peculiar to alcohol. Lead, arsenic, and other toxic conditions produce similar symptoms and similar pathological changes, and it makes me suspect that they are not caused by the direct effect of the alcohol, but are the result rather of microbial toxins, or by autotoxins caused by deranged metabolism. I have examined microscopically the brains of a large number of alcoholic cases and several lead cases; in all of these where there was a pronounced neuritis there were characteristic changes affecting the large psychomotor cells.

The changes in these cells are similar to the changes in the anterior horn cells of the spinal cord, and are very evident; the nucleus is large and clear, it is dislocated to the side, sometimes extruded altogether, there is a marked cell chromatolysis. The Nissl granules may be almost entirely absent or only found at the periphery (vide Fig. 8).

Sometimes the cytoplasm is vacuolated or shows excess of pigment. I have found in a few cases similar changes of the cells of the nucleus of the motor oculi. It may be asserted that these changes in the cerebral and spinal motor neurones indicate a toxic action upon the whole motor efferent path. The changes in the anterior horn cells and the cells of the posterior spinal ganglia are, however, similar to those produced in animals by section of the nerves—namely, there is swelling of the cells, eccentric position of the nucleus, and a disappearance of the Nissl granules from within outwards (perinuclear chromatolysis); it may be, however, concluded that these changes are not solely due to a *réaction à distance* caused by destruction of the peripheral nerves, for similar changes are found in the Betz cells of the motor area (vide Fig. 8). Examination of the sensory path in severe cases often shows profound changes in the posterior spinal ganglion cells and degeneration in the posterior roots and columns of the spinal cord. In one severe case a spinal ganglion was destroyed and only a cavity left. It was the fifth lumbar ganglion and there was glossy skin of the foot on the same side and a trophic sore on the sole.

Owing to fatty changes in the vessel walls haemorrhagic extravasations may occur (vide Fig. 9), sometimes resulting in pachymeningitis haemorrhagica. According to German writers, changes in the nerve fibres of the cortex are the earliest and most essential lesions of the malady. Gudden has described an atrophy of the tangential fibres in four cases, but the atrophy is less extensive than that encountered in general paralysis; the atrophy chiefly affected the frontal convolutions. This has been my experience, and Figs. 1 to 6 are illustrative of this fact. As a rule, cases of Korsakow's psychosis recover unless carried off by intercurrent disease; consequently the mental symptoms must be attributed mainly to functional deterioration of the cortical neurones caused by the poison circulating in the blood; a few cases, however, remain permanently demented, and die in the asylum months or years after admission. These cases are bedridden and the subjects of contracture of the limbs, but I have not had many opportunities of examining the brains of such cases, for they are comparatively rare. I have found atrophy of the association fibres most marked in the tangential and super-radial systems, but also very evident in the inter-radial. In a female with a history of fifteen years' chronic intoxication and marked cirrhosis of the liver, I found a very definite atrophy of the tangential, super-radial, and inter-radial association systems of the cortex in the frontal lobes (vide Figs. 5 and 6). This atrophy was much more evident, as the photomicrographs show, in the frontal lobes than in the central convolutions. When there is contracture of the limbs persistent for several years, there may be atrophy and disappearance of many of the Betz cells, and a degeneration of the crossed pyramidal tracts in the spinal cord. In severe cases rapidly terminating in a fatal result from heart failure I have found multiple haemorrhages in the cortex (vide Fig. 10). Many chronic cases with marked persistent dementia occasionally die in the asylums; these cases were formerly regarded sometimes as general paralysis, but examination of the brain shows few of the characteristic changes of that disease. There is far less wasting of the convolutions, thickening and adhesion of the pia arachnoid membranes. The ventricles do not show the characteristic granulations of the ependyma. Upon microscopic examination there may be marked wasting of the tangential, super-radial and inter-radial association fibres of the frontal lobes (vide Figs. 1–4); but there is not the same degree of cell wasting and distortion of Meynert's column as in general paralysis Moreover, the glia proliferation is less marked, and there is no perivascular infiltration with lymphocytes and plasma cells (vide Figs. 5 and 6). It is easy now to differentiate these cases of pseudo-general paralysis from true general paralysis by examination of the cerebro-spinal fluid. The Wassermann reaction is not obtained, and a cytological examination would not show any marked lymphocytosis or proteid excess.

In conclusion, I wish to thank Dr. Pearson for assisting me in reporting my remarks, which were given extempore.

* I always recommend the patient's legs to be protected by woollen stockings, a board placed at the end of the bed to press against, and the weight of the bedclothes taken off by a cradle. Again, I always recommend massage of the limbs and passive movements of the joints as soon as it can be done. The patient, moreover, is told to try and help the operator in performing the movements by "willing" them, thus opening up the path again between the brain and muscles.

DISCUSSION.

Sir Clifford Allbutt said that much of the literature of alcoholism was of a rhetorical rather than scientific order, and the sooner scientific order and method were introduced the better. The whole question was extremely

complicated. He had found that alcoholics who suffered from nervous symptoms very rarely showed affections of the abdominal viscera; on the other hand, patients who were in hospital for visceral diseases usually retained their intelligence unimpaired. It was always difficult to get behind the alcoholic bent of individuals. Alcoholics were divided into two classes, the spasmodic drinker and the regular boozer. In two cases of the former class he had been struck by the specificity of desire which assailed the patients, and by the fact that they never had any remorse for their deeds. They were comparable to epileptic criminals.

Mr. Shattock (President) asked Sir Clifford Allbutt whether the patients he mentioned would have had that desire for alcohol if they had never tasted it before. He thought the desire was relatively independent o experience.

Dr. E. S. Pasmore (Croydon) said that in one of the sections shown by Dr. Mott there was evidence of definite brain mischief. In those cases, it seemed to him, treatment such as keeping the patient under control for six months would be of no avail. All chronic alcoholics, while showing no visceral affections, had their minds affected, although this might not be observable; accordingly, they should not be trusted.

Dr. C. McVicar (Dundee) said that it was interesting to note that the syndrome of mental symptoms in alcohol poisoning was similar to that of senile degeneration, namely, a disorientation as to time and place. The degenerate patients were admitted, not so much because of the alcohol, but because of the mental degeneracy, and readmissions were associated with the taking of very small quantities of alcohol. The recovery of cases of multiple neuritis with paralysis of the limbs, in association with marked mental changes, was remarkable if the patients were kept under observation for one and a half to two years. Cases of alcoholism showing periodicity were usually impulsive and might be very intellectual.

Dr. Mott, in reply, said that Sir Clifford Allbutt's experience accorded very much with his own. It was the poor depressed man who took alcohol instead of food who suffered so badly and became insane. The convivial drunkards, on the other hand, had a high degree of intelligence; they were chronic boozers for years, then they developed ascites and died; they, however, were able to go on with their work. With respect to Dr. Pasmore's statements about the degeneration of the association fibres, he said that it was extremely difficult to collect such cases. These were probably cases of toxic insanity associated with microbial disease. It was a toxic psychosis more than anything else. He therefore agreed with Dr. McVicar in keeping these patients under observation. Just as the limbs recovered, so did the mind. He was also of opinion that massage of limbs and joints should be undertaken early, and that the feet should be protected from the weight of the bedclothes by a cradle. He was very much interested in Dr. McVicar's remarks on the similarity between alcohol poisoning and old age. He agreed with Sullivan, who believed that alcohol was a poison, but that the insanity was due to an inborn tendency to it. He was glad to hear Sir Clifford Allbutt's remarks on the uselessness of rhetoric in such questions, and strongly applauded the suggestion of the collection of medical pedigrees.

THE THERAPEUTIC USE OF ALCOHOL VAPOUR MIXED WITH OXYGEN.

BY

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Introduction.

The value of oxygen alone as a most beneficial remedy in cases of illness where there is respiratory and cardiac embarrassment is generally recognized, and oxygen has been extensively used on account of its good effect in these conditions.

Recently Dr. Leonard Hill has published some very interesting and valuable investigations showing the marked effect which oxygen has in diminishing the fatigue following violent muscular exercise of various kinds. He has also shown the value of oxygen in mountain sickness.[1]

In this paper we wish to call attention to the very remarkable stimulant effect on the heart and circulatory system produced by the inhalation of oxygen containing alcohol vapour. When this combination is used, it can be readily demonstrated in cases of cardiac failure that the addition of alcohol vapour to the oxygen administered produces a stimulant effect on the circulatory system much greater than that produced by the breathing of oxygen alone. These are the good effects of the oxygen *plus* an additional marked stimulant effect on the circulation caused by the contained alcohol vapour.

The combination of oxygen and alcohol vapour was first used in some experiments on animals made by one of us in 1907 (B. J. Collingwood[2]), in which it was found that after an overdose in chloroform anaesthesia the mixture of oxygen and alcohol vapour was a very valuable remedy for the cardiac failure which had supervened as the result of a toxic dose of chloroform. It was found that the effect of oxygen containing alcohol vapour was greater than that of oxygen alone.

As a result of these experiments, oxygen which had been bubbled through absolute alcohol contained in an ordinary wash-bottle was administered by one of us (W. H. Willcox) in several cases of illness in which cardiac failure was a prominent symptom, and it was found that the mixture produced a remarkable stimulant effect on the heart and circulation decidedly greater than that produced by oxygen alone. In some of these cases the administration appeared to have been the cause of the prolongation and saving of life. In cases of pneumonia with cardiac failure the mixture of oxygen and alcohol vapour was found to be a very valuable remedy, and attention was called to this in a discussion on the treatment of pneumonia at the Harveian Society in April, 1908 (W. H. Willcox[3]).

The subject of the paper will be considered under the following headings:

1. Physiological experiments which led to the use of oxygen and alcohol vapour.
2. The apparatus suitable for the clinical administration of the remedy.
3. The chemical investigations which have been made in order to determine the amount of alcohol vapour present in the oxygen under different conditions of administration.
4. The therapeutic effects of oxygen and alcohol vapour.

I.—*Physiological Experiments.*

Investigations were made into the causation of chloroform apnoea when large doses of chloroform had been administered to cats. It was found during these investigations that frequently marked chloroform poisoning occurred, and the animals presented all the outward signs of death. Respiration had ceased, the blood pressure had sunk to zero, the eyes were soft, and on opening the thorax the feeblest flicker of auricular contraction was the only suggestion of possible recovery. In other cases the poisoning was not so profound, apnoea and a fall of arterial blood pressure being alone observable.

It was found that the apnoea in many cases could be relieved by the administration of carbon dioxide mixed with oxygen and breathing restored. This remedy, however, did not restore the cardiac failure which had supervened, nor did the administration of oxygen alone have the desired effect in raising the fallen blood pressure. In these cases, where cardiac failure remained after respiration had recovered, it was found that the administration of oxygen which had been bubbled through absolute alcohol was a very valuable remedy, and in many cases the blood pressure quickly rose to normal, and the heart's action was restored. It was found that good results followed the administration of air containing alcohol vapour, and the cardiac failure which was not restored by oxygen or air alone quickly recovered when air containing alcohol vapour was administered.

In the above experiments the oxygen and air mixed respectively with alcohol vapour were administered by means of a bellows attached to a tube in the trachea of the

animal. It was found if the absolute alcohol through which the gas was passed had been exposed to air for some time it lost to some extent its beneficial effect, owing no doubt to absorption of water, and thus to there being a smaller amount of alcohol vapour present in the gas which was passed through the diluted alcohol.

II.—*The Apparatus Suitable for the Administration of the Remedy.*

The simplest method of administration is to have an ordinary bottle of about 16 fluid ounces capacity, fitted with a rubber cork with two holes bored in it. Through the holes in the cork pass two glass tubes, one acting as the inlet, which reaches nearly to the bottom of the bottle; the other acting as the exit, and passing just through the cork. The glass tubes should be bent at right angles above the cork. The bottle should be about one-sixth full of absolute alcohol. It is convenient to have a metal collar round the neck of the bottle to which is attached a wire hook, so that the wash-bottle may be attached to the bed or other suitable support.

The oxygen cylinder is attached by rubber tubing to the inlet tube of the wash-bottle, and to the exit tube is attached a length of rubber tubing, to the end of which is fixed an ordinary glass funnel for administering the oxygen and alcohol vapour when held over the mouth and nose of the patient. In an emergency the wash-bottle containing absolute alcohol can be dispensed with, and a pad of wool soaked in absolute alcohol placed in the apex of the glass funnel, which is attached to the rubber tubing connected directly with the oxygen cylinder.

Showing the usual method of administering oxygen and alcohol vapour clinically.

A special convenient form of apparatus has been devised by Dr. Collingwood whereby either oxygen alone or oxygen saturated with alcohol vapour may be administered by turning a tap. It is important that the alcohol used should be absolute and when not in use the apparatus or wash-bottle containing the alcohol should have the inlet and outlet tubes closed by rubber tubing into which glass rod plugs are fixed.

Special facepieces for the administration of the oxygen and alcohol vapours have been used on a few occasions, but these were not found suitable for clinical work, since the patients to whom the remedy was given were extremely ill, and they objected to the facepiece, being apparently under the impression that an anaesthetic was about to be given.

No doubt with a special facepiece, such as that used by Dr. Leonard Hill, more oxygen and alcohol vapour would be absorbed and probably smaller percentages of alcohol vapour in the oxygen would suffice to produce the therapeutic effect than if the administration is carried out in the ordinary way as described above. Usually the administration of the mixture with a glass funnel suffices to produce a marked therapeutic effect in from three to five minutes.

III.—*Chemical Investigations.*

Numerous investigations have been made in order to determine:

1. The effect of the inlet tube for the delivery of the oxygen being below or above the surface of the alcohol in the wash-bottle.
2. The influence of the rate of passage of the oxygen when the inlet tube of the wash-bottle is below or above the surface of the alcohol.
3. The effect of changes of temperature on the amount of alcohol vapour in the oxygen.
4. The effect of using other alcoholic liquids than absolute alcohol, such as rectified spirits, brandy, and whisky.

The most convenient method of determining the effect of the position of the inlet tube relative to the surface of the absolute alcohol and the influence of the rate of flow of the oxygen was found to be the estimation of the loss of weight of the wash-bottle under the varying conditions considered, a measured amount of oxygen being passed through in each case. The weighings were, of course, made on a specially delicate balance.

The results are shown in Tables I, II, and III.

From these the following conclusions are deduced: If the inlet tube is above the surface of the absolute alcohol, then with a rapid flow of oxygen the gas is not saturated with alcohol vapour; with an ordinary rapid flow of oxygen the gas will be less than two-thirds saturated with alcohol vapour. If the inlet tube is below the surface of the absolute alcohol, then the oxygen will be saturated with alcohol vapour in all cases. With a rapid flow a rather greater amount of alcohol will be present in the oxygen than with a slower current of gas, due, no doubt, to some alcohol spray being carried over in particulate form.

The effect of change of temperature on the amount of alcohol vapour present in the oxygen when the inlet tube dips below the surface of the absolute alcohol is shown in Table IV; which table also shows the amount of alcohol vapour present if rectified spirit, brandy or whisky respectively are placed in the wash-bottle.

The results shown in this table illustrate clearly the marked effect which rise of temperature has on increasing the amount of alcohol vapour in the oxygen. The results also clearly demonstrate the importance of using absolute alcohol, and not a weaker spirit, if appreciable amounts of alcohol vapour are to be contained in the oxygen. Thus at 15° C. with brandy or whisky only about 2.2 per cent. of alcohol vapour is present (0.74 grain per litre); with rectified spirit 3.65 per cent. of alcohol vapour is present (1.16 grains per litre); with absolute alcohol 4.7 per cent. of alcohol vapour is present (1.5 grains of alcohol per litre).

In the above experiments the rectified spirit contained 90 per cent. by volume of absolute alcohol; the brandy contained 47.1 per cent. by volume of absolute alcohol; the whisky contained 52.25 per cent. by volume of absolute alcohol.

For determining with great accuracy the percentages of alcohol vapour present at different temperatures with

TABLE I.—*Inlet Tube Half Inch Above Alcohol.*

Experiment.	Temperature C.	Rate of Flow in Litres per Minute.	Alcohol.	
			Grains per Litre.	Percentage of Vapour.
1	12°	0.87	0.73	2.3
2	12	0.37	0.78	2.5
3	12°	0.18	0.97	3.1
4	12	0.14	1.0	3.2

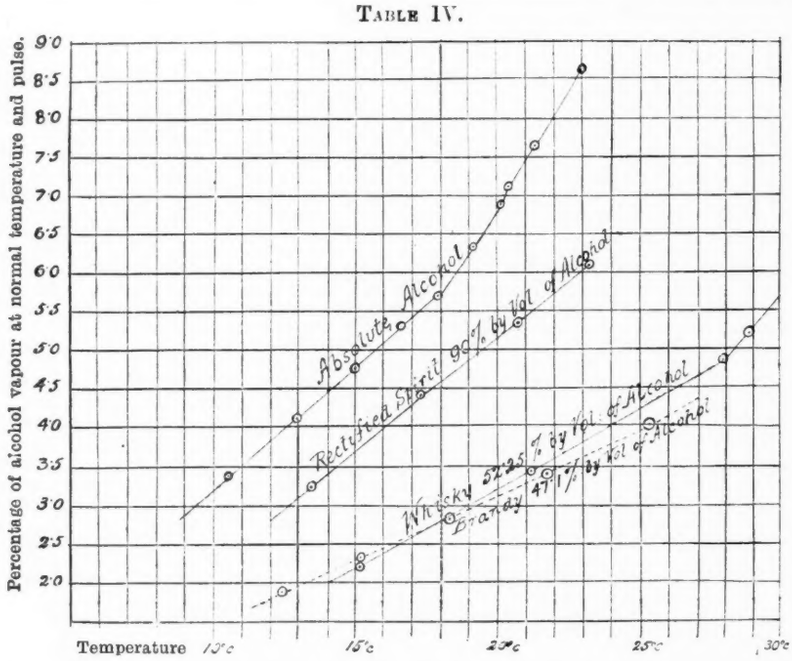
TABLE II.—*Inlet Tube Half Inch Below Alcohol.*

Experiment.	Temperature C.	Rate of Flow in Litres per Minute.	Alcohol.	
			Grains per Litre.	Percentage of Vapour.
1	14°	1 1	1.23	3 9
2	14°	0.95	1.18	3.7
3	14°	0.19	1.08	3.4

TABLE III.—*Comparison. Inlet Tube Above and Below Alcohol.*

Position of Inlet.	Temperature C.	Rate of Flow in Litres per Minute.	Alcohol.	
			Grains per Litre.	Percentage of Vapour.
½ in. below ...	12¾°	1.75	1.1	3 5
,, above ...			0.74	2 3
½ in. below ...	12¾°	0.65	1 0	3 1
,, above ...			0.8	2 5
½ in. below ...	13¼°	0.13	1.3	4 0
,, above ...			1.14	3.6
½ in. below ...	16°	0.52	1.43	4 5
,, above ...			1 0	3.3
½ in. below ...	16°	0 32	1.4	4.4
,, above ...			1.12	3 6

TABLE IV.



different kinds of spirit a combustion method was used the oxygen and alcohol being passed through a red-hot tube containing copper oxide, when the alcohol was converted into carbon dioxide and water. The carbon dioxide produced was absorbed in a weighed soda lime tube, and from the increase in weight of the tube the amount of alcohol vapour present could be calculated with great accuracy.

IV.—*The Therapeutic Effects of Oxygen and Alcohol Vapour.*

When oxygen which has been passed through absolute alcohol is administered to a patient, there is no doubt as to the remarkable beneficial effect in a suitable case. In many cases of acute illness a period arrives at which life may be said to hang on a thread, and if the patient is able to survive this critical period often complete recovery takes place.

Examples of this are the later stages of pneumonia, the shock following severe operations, especially those on the abdomen, the heart failure which occurs sometimes during chloroform anaesthesia, and many other instances which might be cited. Any remedy which has a powerful stimulating effect on the heart and general system is most potent for good at such a critical period, and oxygen which is saturated with alcohol vapour has appeared to us to be a most valuable remedy. In many cases of desperate illness, in which its effect has been carefully observed, we believe that oxygen passed through absolute alcohol has been the means of tiding the patient through the most critical period of his illness, and so of saving life.

It is very interesting to note the amount of alcohol given when administered in vapour form with oxygen. One litre of oxygen when bubbled through absolute alcohol at ordinary temperatures will only contain from 1 to 2 grains by weight of alcohol, and only a portion of this can be absorbed by the lungs, so that it is seen that very minute amounts of alcohol are absorbed into the system.

Sufficient attention does not appear to have been paid to the method of administration of remedies by inhalation into the lungs. It is well known that many remedies produce a marked physiological action in extremely minute doses if the administration is by deep inhalation. Examples of this are amyl nitrite, where the absorption of a minute amount of the drug in vapour form produces a potent physiological effect.

The action of chloroform vapour and other anaesthetic drugs of this type is such that a relatively minute amount of the drug may cause death when inhaled, whereas much larger quantities could be taken with safety by the mouth. Similarly many other drugs, such as atropine and cocaine, in most minute amounts will, if inhaled into the lungs in the form of a finely-divided spray of their solution, produce a definite physiological effect, which will be as marked as that produced by much larger doses if given by the mouth or hypodermically.

The alcohol which is absorbed when oxygen containing its vapour is inhaled appears to be carried direct from the lungs to the heart, and so produces a very marked physiological effect by the direct action on the heart, even though only minute amounts of the drug are being administered. Probably the small amount of alcohol administered in this way is rapidly decomposed, and so does not produce any harmful effect on the tissues of the bodily organs, such as the liver, kidneys, and nervous system.

The administration of alcohol by inhalation must have few, if any, of the objections which can be urged against the administration of alcohol as a stimulant by the mouth. It is well known that formerly alcohol was regarded as a valuable cardiac stimulant, and that it used to be one of the most largely-used remedies for that purpose. In recent years the pendulum has swung in the opposite direction, and it is the custom now to avoid the administration of alcohol by the mouth in cases of illness as far as possible, and considerable doubt has been cast upon the supposed action of alcohol as a cardiac stimulant.

It is most important that, while realizing the dangers and ill effects of alcohol under certain conditions of administration, the medical profession should not lose sight of the good effects which it can be proved that alcohol may have in certain conditions. The common use of alcohol in the mixture of alcohol, ether, and chloroform, known as A.C.E. mixture,[4] has, no doubt, arisen and continued because of the less risk of cardiac failure occurring with such a mixture than with pure chloroform. In other words, anaesthetists have acknowledged by their practice in using A.C.E. mixture for so many years their belief that alcohol has stimulating effects on the heart when its vapour is inhaled.

A very valuable paper on the action of alcohol on the

circulation, by Dr. W. E. Dixon, was published in the *Journal of Physiology* in March, 1907.[5] After a very careful series of experiments, Dr. Dixon proved that in moderate doses alcohol increased the activity and output of the heart, and that in cases of cardiac failure the rise of blood pressure following the administration of alcohol was due mainly to its direct effect on the heart. Dr. Dixon says that alcohol probably produces its effect by providing the heart with an easily assimilable source of energy, since alcohol perfused through an active isolated heart is used up and oxidized. Alcohol may thus act as a direct food to the heart.

In considering the action of alcohol, it is most important that the question of dosage and mode of administration should be carefully borne in mind. Every one is agreed that in large doses alcohol has a depressing action on the circulation, and is a very harmful drug to the tissues of the bodily organs generally.

In moderate doses alcohol may be beneficial in suitable cases, and this beneficial action is certainly likely to be most manifest and to be gained without ill effect when alcohol vapour is inhaled into the lungs with oxygen, for here the alcohol is conveyed direct to the heart, and all the alcohol absorbed by the blood passes immediately through the heart, so that the full effect of the drug is obtained on the only organ on which it is known to have a beneficial action. If given in the form of vapour with oxygen at ordinary temperatures, the amount of alcohol administered is so small (1 to 2 grains per litre of oxygen) that it is impossible to give an overdose.

It is important to remember that the stimulating effect of alcohol on the heart is shown not on the normal organ, but on the heart which is showing signs of cardiac failure. In moderate doses alcohol has little or no effect on the normal heart, but on the failing heart its effects are marked.

Oxygen containing alcohol vapour has little effect on the normal heart, but a very marked effect in cases of cardiac failure. The presence of alcohol vapour in oxygen makes the administration of the gas pleasant to the patient, the effect being warming and soothing to the air passages. There is no irritating effect whatever.

In cases of cardiac failure with feeble rapid pulse and cyanosed or greyish colour of the patient the inhalation of oxygen containing alcohol vapour causes the colour to improve and the pulse to increase in force and volume. If the pulse is rapid—for example, over 100 beats per minute—the inhalation usually causes the rate to be reduced from ten to twenty beats per minute. In cases of cardiac failure with slow pulse the administration is often followed by some quickening of the pulse, so that the frequency becomes about normal.

Where the blood pressure has fallen as a result of cardiac failure, it has been observed that the blood pressure quickly rises when oxygen and alcohol vapour are administered, a rise of 5 to 30 mm of mercury having been measured in several cases with the Riva-Rocci sphygmomanometer. The patient usually expresses himself as feeling much strengthened and refreshed after inhaling the mixture for a few minutes.

It has been found that after the administration of the mixture has been continued for about two minutes the pulse is stronger and fuller, and begins to become slower if rapid. It has been found that the full beneficial effect is obtained after about five minutes if a rapid stream of oxygen through absolute alcohol is administered, and if the administration is now stopped the beneficial effect remains for some minutes. In cases of cardiac failure it has been found convenient to give the oxygen and alcohol vapour in a rapid stream for five minutes every half-hour.

The remedy has been used in a very large number of cases; among these being cases of pneumonia with cardiac failure, pleurisy, cases of heart failure following chloroform anaesthesia and various surgical operations, angina pectoris, attacks of asthma with heart failure, septicaemia, typhoid fever, myocardial degeneration, dilatation of the heart, valvular lesions of the heart, collapse after epidemic diarrhoea, etc.

In a large number of cases where oxygen charged with alcohol vapour has been administered and the above described beneficial effects have been observed, namely, the pulse improved in force and volume and slowed, if rapid, together with a definite rise of blood pressure where it has become low from enfeebled cardiac action, it has been found that the administration of oxygen alone without the alcohol vapour has *not* caused the same improved effect on the pulse and circulation, though, of course, the colour of the patient has improved under the influence of the oxygen when given alone.

So marked have been the results obtained by the administration of oxygen and alcohol vapour in cases at St. Mary's Hospital, London, that it has become the custom to keep in every ward of the hospital and in the operating theatres wash-bottles containing absolute alcohol ready for cases of emergency, so that oxygen and alcohol vapour may be administered without delay.

Many medical men have reported to us cases where the administration of the remedy has been followed by marked beneficial results.

For assistance in the above work our thanks are due to Mr. John Webster, F.I.C., who gave valuable assistance in the chemical investigations; Dr. E. Holmes, House Physician of St. Mary's Hospital, who made several observations on the effect of the remedy in cases under his care; and to Mr. H. L. Buswell and Mr. R. F. Wilkinson for valued assistance in the physiological experiments.

Conclusions.

1. The administration of oxygen bubbled through absolute alcohol is a marked cardiac stimulant in cases of heart failure.
2. The administration is pleasant and non-irritating to the patient; it causes no ill effects to the lungs or bodily system.
3. A rapid feeble pulse is slowed by some 10 or 20 beats per minute, and there is a marked improvement in its force and volume. The blood pressure, if low from cardiac failure, is raised from 10 to 30 mm. of mercury as measured by the Riva-Rocci sphygmomanometer.
4. It is better to use absolute alcohol in the wash-bottle, since with less concentrated forms of alcohol an insufficient amount of alcoholic vapour will be contained in the oxygen.
5. The oxygen should be bubbled through the alcohol in a rapid stream.
6. The full effect of the administration is obtained after five minutes, and lasts for several minutes afterwards. As the effect passes off the administration should be repeated.

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DISCUSSION.

Dr. A. E. Boycott (London) said that the amount of alcohol absorbed by the patient must depend on the rapidity of flow of the gases, and that consequently the figures set down expressed inadequately the amount of alcohol taken.

Dr. Mott (London) asked if Dr. Willcox had noticed any alteration in the depth of respiration after the inhalation of the vapour, and whether he thought that the alcohol was acting on the nerves at all.

Sir Clifford Allbutt (Cambridge) asked if the cyanosis disappeared, and also if there had been any experiments with alcohol vapour alone.

Dr. J. Mackie Whyte (Dundee) said that Binz had shown by repeated experiments that the respiratory system was stimulated by alcohol. The explanation of this phenomenon offered by his critics was that it was an effort on the part of the body to neutralize the bad effects of the alcohol, more especially with respect to the interference with the proper oxygen supply of the blood. Possibly the addition of oxygen prevented this bad effect. Could Dr. Willcox say in what way precisely the stimulant

showed itself? Was it on the heart mainly or on the blood vessels—a peripheral vasomotor paralysis?

Dr. WILLCOX, in reply, agreed with Dr. Boycott that the figures set down were not high enough: he had not paid particular attention to variations in the depth of respiration. The cyanosis cleared up probably because of the presence of the oxygen. In answer to Dr. Mackie Whyte's remarks, he said that some experiments of Dixon seemed to prove that the action on the heart was more marked.

SOME OBSERVATIONS ON FATAL CASES OF PULMONARY THROMBOSIS.

BY

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THE fatal occlusion of the pulmonary artery by an embolus or thrombus is deeply interesting, not only to the physician, the surgeon, and the obstetrician, on account of the tragic suddenness with which death occurs, but also to the pathologist who is called upon to decide at the necropsy whether the foreign bodies plugging the pulmonary artery are the result of embolism, thrombosis, or both. By the majority of writers clots present in the pulmonary artery are almost invariably ascribed to embolism. There is no mention of primary spontaneous thrombosis in the majority of textbooks on medicine, surgery, or midwifery. A few allude to it as a possibility or of rare occurrence. Embolism is held to be commoner than spontaneous thrombosis by Frederick Roberts, Fowler and Godlee, and Welch. On the other hand Playfair, Méry, Newton Pitt, and Box appear to maintain that primary thrombosis is not only common, but commoner than embolism.

It is a curious fact that, though many writers have carefully described the macroscopical appearances of the clots found in the pulmonary artery, no attention whatever has been paid to their *microscopical* structure. This is all the more remarkable since, as is well known, the microscopical structure of a thrombus alters with age. In those cases of supposed pulmonary embolism in which thrombi extend far into the lungs this extension is assumed to be the result of encapsuling and secondary thrombosis. But a careful microscopical examination would almost certainly demonstrate the truth or falseness of this assumption.

The following are the changes produced by age in pulmonary thrombi to which we attach the greatest importance:

1. The erythrocytes in a recent thrombus have very distinct outlines, and when stained with eosin are bright red. Later their outlines disappear, they fuse together, and take a brownish tint with eosin. Later still brownish-yellow haemosiderin pigment appears in increasing amount as fine granular deposit, which is soon found inside the cytoplasm of the leucocytes present in the clot. Finally, the surrounding artery wall itself becomes pigmented; the pigment may even be found in adjacent cartilage.

2. The polymorphonuclear leucocytes, which are present even in aseptic thrombi and tend to increase in numbers through emigration, retain their normal appearance and staining capacity, and are destitute of pigment at first; but soon karyorrhexis and karyolysis of the nuclei take place, the margins of the cytoplasm become indistinct, and the cell eventually disappears. If the leucocyte had contained much pigment its original site is marked by a brown, faintly-granular mass.

3. Organization is proof positive that the thrombus has been *in situ* for some time.

The rapidity with which haemosiderin occurs depends partly upon general conditions, such as the presence of haemolysin in the blood, from streptococci, etc., and probably upon local cellular conditions.

Although we can make no definite statement as to the exact time pigmentation takes to appear, for it must vary with circumstances, it is perfectly clear that the liberation of haemoglobin from the erythrocytes, its deposition as haemosiderin, its entrance into the leucocytes and later into the connective tissue of the surrounding artery, is not a question of minutes, but of hours, sometimes days; and none of our patients lived more than thirty minutes after the onset of the symptoms.

The eight cases about to be described occurred in the *post-mortem* room of the Liverpool Royal Infirmary during the years 1902-1909 inclusive, and we are indebted to the honorary physicians and surgeons for permission to use them. The thrombi were examined microscopically in 7 cases. In the last 5 the heart and lungs were removed together, and the distribution of the thrombi was not finally ascertained till the organs had been fixed and hardened.

CASE I.

J. L., male aged 50, admitted 1902, with anterior hypopyon following injury. He declined to have his eye removed, and was kept in bed. On the nineteenth day after admission, on going to stool at 5 a.m., he was suddenly seized with dyspnoea, thoracic pain, and slight cyanosis, and died in about fifteen minutes.

At the *post-mortem* examination, the right ventricle and pulmonary aorta contained no clots, but situated in the stem of the right and left pulmonary artery and extending into the lungs were two branched stratified thrombi, the main stem of each being 3 in. or 4 in. long. The proximal end of one thrombus appeared to be composed of two separate pieces of clot coiled together. (The diameter of the thrombi varied from ⅝ in. to less than ¼ in.) The pulmonary aorta was *empty*, so the clots in the right and left branches were separated from each other.

Microscopical examination of the coiled extremity of the largest clot demonstrated that it was of recent formation, was not composed of two thrombi twisted together, but of a single laminated piece, the inner white layers being arranged like a figure of 8. Thus the coils were evidently due to secondary eddies in the thrombosing blood. Two pieces of thrombi from the smallest vessels showed extensive pigmentation, and were therefore old. No source for embolism was discovered, the ophthalmic veins contained no clot.

Evidence in Favour of Spontaneous Thrombosis.—(1) Stratified thrombi in both pulmonary arteries, separated from one another. (2) Pigmentation of smaller thrombi. (3) No systemic clotting.

CASE II.

E. M., male, aged 12, operated on for appendix abscess, November 26th, 1904. A sinus formed and occasional pyrexia continued until January 8th, when the appendix was removed. The patient was progressing normally, but at breakfast he became cyanosed, and died in less than twenty-five minutes. At the *post-mortem* examination the abdomen was normal. The heart contained a yellow agony clot, which extended as far as the bifurcation of the pulmonary aorta. Beyond this point it became stratified and extended along the pulmonary arteries, some branches reaching far into the lungs. Microscopical examination demonstrated that the larger thrombi were of recent origin; they contained no pigment, but three out of four separate pieces of smaller thrombi were extensively pigmented, and had therefore been laid down first. No source of embolism was discovered.

Evidence in Favour of Spontaneous Thrombosis.—(1) Stratified thrombi in both pulmonary arteries, also in smaller branches. (2) Pigmentation of smaller thrombi. (3) No systemic clotting.

CASE III.

M. T., female, aged 52, had the right breast and some axillary glands removed for cancer, June, 1905. Progress satisfactory until the sixth day, when the temperature was 101° F., and on the sixteenth day 100° F. At 5 a.m. on the seventeenth day the patient had a cup of tea; at 5.5 a fit with cyanosis; at 5.10 she was dead.

At the necropsy the wound was healthy, the brain normal. The heart weighed 11oz., being somewhat hypertrophied and dilated. There was extensive fatty infiltration of the myocardium. A yellow agony thrombus was present in the right ventricle, and typical laminated thrombi in both branches of the pulmonary artery, extending some distance into the lungs. No thrombi were found in the axillary or iliac vein or inferior vena cava.

No microscopical examination was made of these thrombi, but they were undoubtedly truly *ante mortem*.

CASE IV.

B. D., aged 10, was shot in the hip on July 29th, 1906, at 9 a.m. Suppuration and pyrexia immediately occurred. On August 1st the head of the femur was excised.

At 9.45 next evening the child was fairly well; at 10 p.m. the nurse found her dead.

At the *post-mortem* examination a red thrombus was present in the right auricle. The pulmonary aorta was empty, so was the right pulmonary artery, even to its terminal ramification, but a laminated thrombus (with a maximum diameter of 0.4 cm.) commenced in the left pulmonary artery 2½ cm. from its origin from the aorta, and extended into some of the branches into the upper lobe.

Certain smaller branches also contained clot which was unconnected with the main stem.

The artery to the lower lobe contained no thrombi for its greater part, but two vessels in the base with a maximum diameter of 2½ mm. were full of clot separate from the main thrombus by a distance of 4 cm., and spreading into the smallest branches of the artery.

Ten different portions of the thrombi were examined microscopically and demonstrated that the proximal end of the main clot was of recent origin; that its distal end was older, for in the latter pigment had appeared, some being present in the leucocytes, while certain of the smaller thrombi in the lower lobe were older still, because the leucocytes had autolyzed, leaving pigment masses behind them. Occasionally the artery walls were also pigmented. Other of the smaller thrombi were of recent origin. The hip-joint contained pus. No source of embolism was discovered.

Evidence in Favour of Spontaneous Thrombosis—(1) The presence of pigment in the distal end of the main stratified thrombus. (2) The separation of some peripheral thrombi in both lobes from the main thrombus. (3) The age of some of the peripheral thrombi as indicated by extensive pigmentation, etc. (4) No systemic clotting. (5) The presence of the thrombi in the left lung; embolism is said to be more frequent in the right lung.

CASE V.

W. E., male, aged 64, had his jaw excised for epithelioma on September 10th, 1907. He progressed normally, but on the 15th his temperature rose to 99.2°. Next day he had a heart attack, and died suddenly in half an hour at 9 a.m. on the seventh day after operation.

Post-mortem Examination.—Situated in the pulmonary aorta was a Y-shaped thrombus the stem of which measured 10½ cm., and reached into the right ventricle, where it formed an irregular mass about 2 cm. transversely. The limbs of the Y spread into both pulmonary arteries, that to the right being separated by an interval from other thrombi which reached into some of the finer ramifications of both lobes, that to the left extended a short way into all the main branches of the upper lobe only, but there were a few isolated thrombi in the smaller branches of the lower lobe. There were some patches of consolidation in the right upper and lower lobes. The systemic veins were not examined.

Ten separate pieces were examined microscopically. The stem of the Y in the right ventricle was composed mainly of old with some recent thrombus. The right limb showed advanced pigmentation and karyorrhexis of the leucocytes. One smaller thrombus in the right upper lobe was much older, the pigment having extended to some adjacent cartilage. The left limb of the Y was of more recent origin. Some of the isolated thrombi in the lower lobe contained much pigment which had slightly infiltrated the vessel wall. The pneumonic patch in the right upper lobe contained Gram-negative bacilli about the size of colon bacilli.

Certain veins in the myocardium had evidently thrombosed some days before death, for they were full of pigment. The red blood corpuscles were normal in those arteries which contained blood, and in the majority of the capillaries.

Evidence in Favour of Spontaneous Thrombosis.—(1) The shape of the thrombus in the pulmonary aorta and its right and left branches, and the absence of an encapsuled embolus in it. (2) The isolated thrombi in both lower lobes. (3) The pigmentation of the thrombi and especially of the artery walls. (4) The spontaneous thrombosis in the myocardial veins.

CASE VI.

S. K., aged 46, a woman with a moderately enlarged thyroid and slight exophthalmic symptoms, had hysterectomy for cancer on May 28th, 1908. The operation was followed by slight daily pyrexia. On June 12th and 13th the patient complained of palpitation and uneasiness, but the house-surgeon found the heart normal. On the 14th, at 10 a.m., she became cyanosed, the pulse extremely rapid, and she died in a quarter of an hour, eighteen days after laparotomy.

At the necropsy the external wound was healthy, but the stump of the left Fallopian tube was septic. Commencing at the bifurcation of the inferior vena cava, and extending onwards down the left common iliac and left femoral vein as far as the knee, was a true *ante-mortem* thrombus, which was firmly adherent to the vein for 1 in. below Poupart's ligament. A smaller thrombus extended down the right common iliac vein for a few inches.

The right ventricle contained red and yellow clot, which extended into the pulmonary aorta. Distinct from this, and lying at its bifurcation, was a cone-shaped piece of true *ante-mortem* thrombus, measuring 2 in. longitudinally, blunt at one end. Three large thrombi arose separately in the right lung, two passing to the upper lobe—one extending into the smaller branches—the third to the lower lobe, almost completely occluded the main vessel and was adherent, its maximum diameter being 1.16 cm.; some of its branches extended into an infarct at the base. A large thrombus started from the left pulmonary artery at its bifurcation to the two lobes, some portions of it extending to the finer branches and others ending bluntly. There were small infarcts at both bases.

Fourteen different parts of these thrombi were examined microscopically. The main thrombi in both upper and lower lobes were laminated and pigmented locally. Many leucocytes were also pigmented, but they still stained normally. Some of the smaller thrombi were older, others quite recent. There was pigmentation of some of the artery walls in both lower and the right upper lobe. Two portions of the adherent thrombus in the right lower lobe showed organization, which was more advanced at the periphery where canalization had begun.

Fig. 1.—Case VI. Showing commencing canalization of thrombus from right lower lobe.

A section of the femoral vein with the adherent thrombus showed the clot to be slightly pigmented and organization beginning. There was no round-celled infiltration in the vessel wall and bacteria were absent. Old pigmented thrombi were present in some of the myocardial veins.

Evidence in Favour of Spontaneous Thrombosis.—(1) The complete separation of the thrombi in the two lungs from one another. (2) The extensive amount of pigmentation in some of the thrombi in every lobe, and specially in some of the vessel walls surrounding them in three lobes, proving that several had been *in situ* for a considerable period. (3) The organization in the clot of the right lower lobe more advanced towards the periphery. (4) Spontaneous thrombosis in the veins of the myocardium.

Comment.

This is the only case of the series with extensive thrombosis of the systemic veins, and it suggests the possibility of embolism, especially as there was a loose thrombus in the pulmonary aorta. But embolism will not explain the peculiar and widespread distribution of the pulmonary clots, their macroscopic appearances such as the absence of signs of fracture, and their microscopical character. It is noteworthy also that organization was not as far advanced nor pigmentation as extensive in the adherent piece of femoral thrombus as in the adherent piece of pulmonary thrombus.

The acceleration of the pulse, which began on the fifth day after the operation—a point which will be alluded to later—also suggests spontaneous thrombosis. The occurrence of clots in both pulmonary arteries separately, in the iliac veins, and in the myocardial veins (other organs not examined microscopically), suggests a general tendency to spontaneous thrombosis throughout the body. The balance of evidence is strongly against embolism.

CASE VII.

E. H., male, aged 57, operated upon for inguinal hernia, November 26th, 1909. The operation was followed by slight pyrexia. On the sixteenth day after the operation, while taking breakfast, he complained of faintness. After finishing it and lying down again he was suddenly seized with intense dyspnoea, became slightly cyanosed, and was dead in half a minute, at 7 a.m.

At the *post-mortem* examination there was slight cellulitis at one end of the inguinal incision. The inferior vena cava, and all the iliac veins were normal, but the right femoral vein contained a small piece of thrombus the size of a threepenny-bit, lying over the orifice of the external pudic vein. There was a similar piece in the left femoral vein, in the mouth of the external

circumflex vein. The veins in the calf were normal. The left ventricle was dilated, there being fibroid myocarditis (verified microscopically). No clots were found in the right auricle and ventricle, but a large thrombus began at the posterior cusp of the aorta, into which it partially fitted, and extended along the left pulmonary artery into both lobes. Some of the thrombi in the smaller branches were distinct from the main stem. The clot in the left artery was quite separate from that in the right, some of those in the lower lobe being continued into the finest branches. The larger thrombi showed a distinct tendency to coil. There were patches of pneumonia in all, and small infarcts in three lobes.

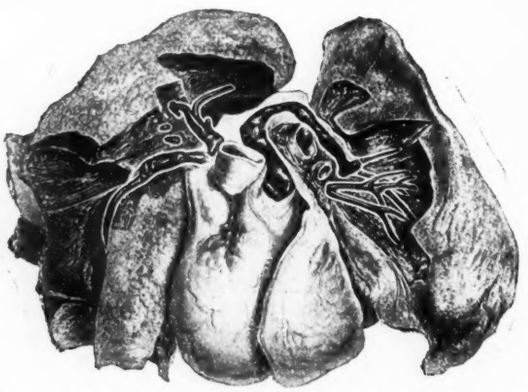

Fig. 2.—Case VII. Showing separation of thrombi in the two lungs from each other, and separation of individual thrombi in the same lung. (Note the coiled appearance of part of thrombus to right lower lobe.)

Fourteen different pieces of thrombus were examined microscopically. It was found that the large thrombi in the pulmonary aorta and its two branches had been recently deposited, but many of the smaller thrombi were much older, the walls themselves being pigmented in two pieces of tissue from the right, and in three from the left lung respectively.

Slender columns of spindle cells, with oval nuclei indicating commencing organization were found in three blocks, one from each lower lobe, and one from the left upper lobe. There were numerous patches of pneumonia, and large colonies of streptococci distributed through both lungs, but none was found in the thrombi, though looked for. The small thrombus from the right femoral vein was pigmented centrally but not organized.

Evidence in Favour of Spontaneous Thrombosis.—(1) The separation of the thrombi in the two lungs from each other and of individual thrombi in the same lung. (2) Pigmentation of certain thrombi and even of the artery walls surrounding them in both upper and lower lobes. (3) The occurrence of organization in the left upper and both lower lobes.

CASE VIII.

E. G., female, aged 44, had hysterectomy for fibroids on October 25th, 1909; slight evening pyrexia followed. On the fifteenth day a patch of consolidation developed at he right

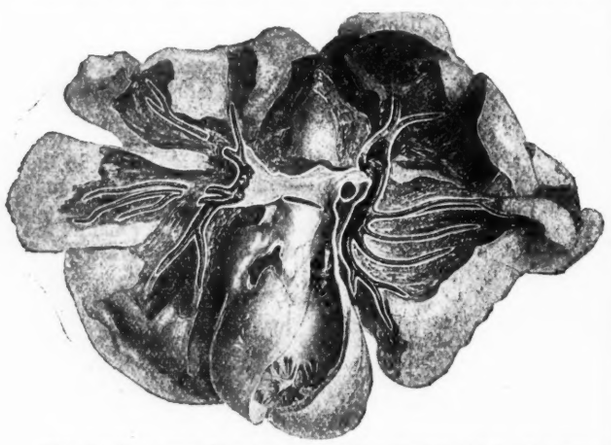

Fig. 3.—Case VIII. Showing separation of thrombi in the two lungs from each other, isolated peripheral thrombi in the right upper lobe, and loose thrombus in ventricle.

base. On the eighteenth day, after a good sleep, patient had a drink, and was immediately seized with an acute precordial pain. She became slightly cyanosed, and died in ten minutes at 4 a.m.

At the *post-mortem* examination the wound was healthy, there was no trace whatever of lymph nor pus. No thrombi were found in any of the systemic veins after a careful search. The right ventricle contained a small quantity of red clot; also a loose oval *ante-mortem* thrombus, 1 in. long, without any signs of fracture in it, and to which was attached a small quantity of recent red thrombus. The pulmonary aorta was empty, but 1 in. beyond the bifurcation thrombi commenced, which extended into both lungs; those to the upper lobes being less numerous and extensive than those to the lower, which often ramified into the smallest vessels; some were also slightly adherent. Three small infarcts were found, two of them in the right lower lobe.

Twelve different portions of the lungs and clot were examined microscopically. The isolated thrombus from the left ventricle consisted of laminated material with softening and advanced pigmentation in the centre. The characteristic features of the other thrombi were a slight amount of pigmentation and the commencement of organization in some from both bases, and in an infarct from the left upper lobe. There was some purulent bronchitis in the right base, with clusters of Gram-positive cocci in the lumen of the bronchus and the adjacent pulmonary tissue. This bronchitis probably accounted for the temperature.

Evidence in Favour of Spontaneous Thrombosis.—(1) The separation of the thrombi in the two lungs from each other, and the occurrence of isolated thrombi in each lung. (2) The occurrence of organization in both lower lobes. (3) The absence of thrombi in the systemic veins.

Comment.

The large loose thrombus in the right ventricle had apparently been formed in the pulmonary artery, not the heart, because globular thrombi were absent among the columnae carneae, and the right auricular appendix was empty. Neither was it formed in the peripheral veins, because the central softening indicated that the thrombus was an *old* one, and it is very improbable, if thrombosis had occurred so long before death in the systemic veins, that *no other* thrombi should be found in any of them.

GENERAL SUMMARY.

The following evidence indicates that the thrombi in the pulmonary artery originated spontaneously in the 8 cases.

A.—*Macroscopic.*

1. Laminated thrombi were present in *both* lungs in all except Case IV, and those in the right and left lung were separate from one another in Cases I, II, VI, VII, and VIII. The shape of the main thrombus in Case V and the absence of a central embolus in it has been alluded to.

2. Peripheral thrombi occurred in the small branches of the pulmonary artery separate from main thrombi in the larger branches in Cases IV, V, VI, VII, and VIII.

3. The impossibility of laminated thrombi, often extending into the terminal ramifications of the pulmonary artery, being deposited in from one to thirty minutes—the duration of symptoms following the impaction of the supposed embolus.

B.—*Microscopic.*

1. Lamination of the majority of the thrombi.

2. Pigmentation in certain thrombi, usually the peripheral, in all 7 cases examined microscopically.

3. Pigmentation of the artery wall surrounding the thrombi in all 5 cases in which the lungs were examined microscopically—namely, IV, V, VI, VII and VIII.

4. The occurrence of organization of the thrombi in 3 out of the 5 cases in which the lungs were examined microscopically, involving one, two, and three lobes respectively.

C.—*Absence of Systemic Thrombosis.*

1. No source of emboli was found in the systemic veins in 5 out of 7 cases examined; nor in the heart, including the auricular appendices, in any case, though Cases VI and VIII contained a loose thrombus in the pulmonary aorta and ventricle respectively.

2. The occurrence of pigmented thrombi in the myocardial veins in Cases V and VI, and the small thrombus at the orifice of a vessel opening into each femoral vein in Case VII suggests a general tendency of the blood to thrombose. Even in Case VI, in which extensive systemic thrombosis occurred, the pulmonary clots were probably of spontaneous origin.

ETIOLOGY.

This may best be considered in relation to the causes of thrombosis as given by Welch.

A.—*Contact of the Blood with Abnormal Surfaces.*

There was neither macroscopic nor microscopic evidence of atheroma, arterio-sclerosis nor acute arteritis in the

pulmonary vessels in any of our cases. The valves of the heart were normal, so was the myocardium, except in Cases III and VII, where the ventricles were dilated from extensive fatty infiltration and fibroid myocarditis respectively.

B.—*Slowing and other Irregularities of the Circulation.*

1. All our patients were confined to bed and were consequently exposed to the danger of passive congestion of the lungs.

2. The myocardial disease present in two cases might have interfered with the normal circulation.

3. Thrombosis on the whole was more extensive and older in the lower lobes and bases of the lung. It was here also that organization most frequently occurred.

4. With one exception all the patients died in the morning, six before 9 a.m. The physiological slowing of the pulse during sleep probably accelerated the thrombosis.

C.—*Bacterial Infection and* D *Chemical Changes in the Blood.*

These may be taken together. Bacteria were probably partly responsible for thrombosis in all instances, because—

1. Collections of pus were present in Cases I, II, IV, VI, and VII. Case V, with excised jaw, was probably septic.

2. Slight pyrexia usually daily occurred in Cases II, III, IV, VI, VII, and VIII. The temperature chart of Case I is missing.

3. Three out of the five lungs examined microscopically showed some acute inflammation and contained clusters of bacteria.

4. All cases had been anaesthetized and operated upon except No. 1, hence the possibility of bacterial infection through the lungs or wound.

On the other hand, no bacteria were found in the thrombi nor in the walls of the thrombosed vessel, though specially looked for in sections stained with Gram and methylene blue.

It is noteworthy that in half the cases the operation was upon the abdomen; in half also death took place from the fourteenth to sixteenth day after the operation.

The factors described were predisposing, but the determining causes were not apparent.

Assuming that thrombosis was slowly taking place in the pulmonary artery, how is it that no symptoms were apparently produced? The reasons seem to be the following:

1. Gradual obliteration of several branches of the pulmonary artery by thrombosis is far less likely to produce symptoms than the sudden obliteration of a much smaller branch by an embolus.

2. The patients were resting in bed; consequently there was no tax upon their circulatory system.

3. Signs of impending danger may be overlooked in surgical wards. Thus it is not always customary to make a systematic record of the pulse or respiration-rate long after an operation in patients who are apparently progressing favourably; and it was only in the last three cases that we were able to obtain any data.

Here we were pleased to find that the mean of the morning and evening pulse-rate showed a definite and permanent acceleration, beginning from the seventh to the eleventh day after the operation. Thus the average pulse-rate of these patients for the three days immediately following the operation was 86, 86, and 82 respectively, compared with the average pulse-rate for three days immediately preceding death, which was 126, 96, and 106 respectively (see chart).

The charts prove that this acceleration was not due to a rise in temperature. This clinical fact supports the thesis that the patients died from spontaneous thrombosis. Case VIII, the only one in which the respirations were regularly recorded, shows a similar increase in the rate from 25 to 31; of course this may have been due to the patches of streptococcal pneumonia.

It is noteworthy also that Case VI complained of palpitation two days before death, and Case VIII evidently had an infarction three days before death. The occurrence of small infarcts in three cases in itself suggests primary thrombosis, for it is doubtful whether embolism could produce infarction in the few minutes which elapsed after the supposed impaction.

The possibility of rapid and even instant death is admitted by those authors who believe in primary spontaneous thrombosis, still it is rather remarkable that death should occur

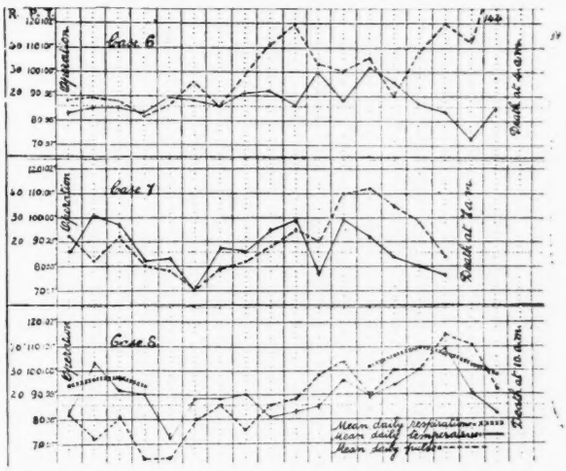

Fig. 4.—Charts from Cases VI, VII, VIII, of average daily pulse-rate ------ and average daily temperature —— proving that the gradual increase in pulse-rate is not the result of an increase in temperature. In Case VIII the respirations xxxx are also shown. (Note the hour of death should be reversed in Cases VI and VIII.)

so suddenly as obtained in our cases. But it must be remembered that thrombosis when once established probably progresses with an ever-accelerating rate, and, as Playfair points out, it is only

when some sudden exertion was made, such as rising from bed or the like, calling for an increased supply of blood, which could not pass through the occluded arteries, that fatal symptoms manifested themselves.

Several of our patients died after exertion. Dr. Box's suggestion, that the acute symptoms may be due to the sudden displacement of the thrombi which have formed spontaneously in the pulmonary artery or right ventricle, is a reasonable one, though in Cases VI and VIII, the only ones in which loose thrombi were discovered, the patients lived about ten and fifteen minutes respectively after the first acute symptoms.

The evidence at our disposal indicates that thrombosis does not begin in the capillaries but in the smaller arteries, probably at their bifurcation (cf. the thrombi in the femoral veins in Case VII), and spreads in both directions but more slowly against the blood stream. The thrombi do not

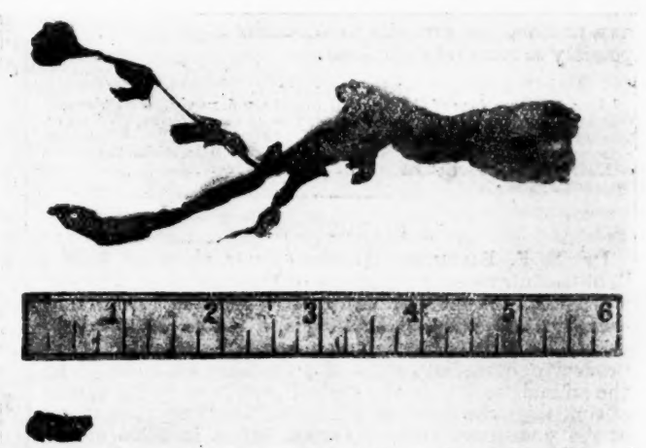

Fig. 5.—Small embolus found in right pulmonary artery (Case A). Large embolus found in tricuspid orifice (Case B.)

completely fill the larger vessels, and apparently only a portion of their circumference is actually in contact with the vessel wall. The coiling and twisting of the

thrombi upon which stress is laid is in itself no proof of embolism unless they can be unravelled, or unless sections prove that separate strands of an embolus have been glued together by encapsuling thrombosis. We believe that eddies in the blood may produce a coiled appearance in spontaneous thrombi as obtained in Cases I and VII.

Critics may suggest that the plugs in the pulmonary vessels are secondary to the impaction of an embolus. Apart from the fact that these hypothetical emboli must have been deposited in both lungs in seven cases, the time allowed for this secondary thrombosis is too short. Surely it is a question of hours, perhaps days—not minutes. No one believes that stratified thrombi in the systemic veins—the femoral, for instance—progress at the rate of an inch or more in a few minutes. Why should they, then, in the lungs? The following are instructive cases of true embolism:

CASE A.—E. T., female, aged 21, with infective endocarditis of the pulmonary valves, was progressing favourably, when she died suddenly with slight convulsions under five minutes. The brain was normal. An embolus derived from the pulmonary valve, ¾ in. long, was found plugging the main branch of the pulmonary artery supplying the right lower lobe. Now, there was *no thrombosis* in the neighbourhood of, or surrounding, this embolus; thus the blood had not clotted during the few minutes the patient survived its impaction.

CASE B.—C. R., female, aged 40, had double ovariotomy, June 10th, 1909, at the Liverpool Hospital for Women. Thirteen days later she awoke at 1 a.m., used the bedpan, said good-night, and instantly died. A long *ante-mortem* thrombus, bifurcated at its extremity, which had undoubtedly come from the inferior vena cava and its branches, was found coiled up in the right auricle and orifice of the tricuspid valves; but it could easily be unravelled, as there was *no encapsuling* thrombus. The lungs were normal.

CONCLUSIONS.

In our experience spontaneous thrombosis is much commoner than embolism, in the proportion of 8 to 1 in some 1,200 *post-mortem* examinations from a single hospital. We believe an unaccountable acceleration of the pulse or respiration-rate, beginning in the second week after a major operation, especially abdominal, and associated with slight pyrexia, suggests the possibility of spontaneous pulmonary thrombosis and of a sudden fatal termination about the third week.

Cases of spontaneous thrombosis are overlooked from the assumption that only embolism can cause death in a few minutes, from neglect to remove and harden the heart and lungs together, and trace the distribution of the thrombi *in situ* in properly hardened specimens, and especially from neglect to make a thorough *microscopical* examination.

Even the association of pulmonary clots with others in the systemic veins does not necessarily prove that the former are embolic. Both may have arisen spontaneously and separately from similar causes.

This paper is necessarily incomplete, and many of the points raised are controversial; but perhaps it may cause some sceptics who regard primary pulmonary thrombosis as a pathological curiosity to reconsider their position, and possibly to remodel their ideas.

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DISCUSSION.

Dr. E. F. BASHFORD (London) drew attention to the light the intravenous injections of the emulsions of cancer threw upon the size of the thrombi which might be present *ante mortem* without evident signs of their existence. In these experiments it was necessary to inject an emulsion producing immediate signs of pulmonary embolism. In the animals surviving the emboli grew, and in the course of time might be found as "thrombi," blocking a large part of the pulmonary arterial system before invasion of the lung tissue took place. The same thing occurred naturally during the dissemination of cancer both in man and animals. Therefore it seemed to him that the extensive thrombosis described by Dr. Glynn and Dr. Box was not incompatible with its *ante-mortem* occurrence, provided it had developed gradually, whether it arose from embolus or spontaneously in the vessels.

Dr. C. R. BOX (London) said it was gratifying to find that Dr. Glynn had been able to confirm the occurrence of primary pulmonary thrombosis as a cause of sudden death. In a paper read before the Clinical Society of London in 1906 the speaker had attempted to show that the suddenness of death in these cases was due to a process of embolism superadded to the pulmonary thrombosis, that portion of the clot which lay in the main pulmonary stem becoming detached from its anchorage in the heart and impacted further up, nearer the bifurcation of the pulmonary artery. That the coiled appearance of the clot in these cases was not always due to blood eddies was shown by the fact that in one of the speaker's cases the impacted clot bore the impress of the pulmonary semilunar valves.

A METHOD OF DISTINGUISHING DEAD FROM LIVE LEUCOCYTES.

By Professor C. ACHARD,
Paris.

I HAVE undertaken, with two of my pupils, L. Ramond and Ch. Flandin, some researches on the distinction which may be drawn between dead and living leucocytes by using neutral red. Living leucocytes are uncoloured, or contain red-stained and intraprotoplasmic vacuoles or granulations. Dead leucocytes show their nuclei red-brown, and no intraprotoplasmic coloration.

The technique is very simple. Two solutions are used: the one is physiological salt solution with 6 per 1,000 of citrate of sodium; the other is a physiological salt solution with 1 per 1,000 of neutral red. We mix in a tube ten drops of each solution and we add one drop of blood, or one to four drops of the sediment of a centrifugalized exudate containing white cells; the tube is placed in the incubator and kept at the temperature of 37° C. for twenty minutes, then the liquid is examined in a glass cell, and the living and dead leucocytes are separately enumerated.

In the circulating blood there are no dead leucocytes, even in the most grave diseases. If occasionally a few dead leucocytes are seen, fresh preparations must be made again and examined within five minutes, in order to avoid accidental injuries of the white cells; then they generally yield no nuclear staining.

In various exudates dead leucocytes are not scarce, especially in cases of suppuration. In abscesses the number of dead leucocytes suddenly decreases after the incision. In acute meningitis, it appears that the variations in the dead leucocytes are valuable for prognosis; their disappearance is a good sign, their increase an unfavourable indicator. Weill and Policard, of Lyons, who have recently controlled our method, have obtained similar results.

Of course, since the test of dead leucocytes is an anatomical method, it gives an account only of the local process—namely, of the local prognosis. But in acute meningitis the relationship of local to general prognosis is evident.

The red staining of the nucleus is also observed in recently dead and not yet disintegrated cells. Therefore a few stained nuclei are found in old suppurations, for instance, in tuberculous empyema, amongst a great deal of indistinct leucocytic remains.

In conclusion, we believe that this very simple method can be applied to pathological and clinical investigation. The remarks made applied to all leucocytes, more especially the polymorphonuclears.

THE EFFECTS OF ARTIFICIAL RESPIRATION ON THE STILLBORN.

By J. A. BRAXTON HICKS, M.D., B.S.Lond., D.P.H.Camb.,
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PUTTING aside the legal question, which is nevertheless an important one, as to whether the child was "born alive," and admitting that the fetus has reached a stage of intra-uterine existence at which it might reasonably be supposed to live if born, there is no doubt that the proof of the act of respiration furnishes the best evidence of the child having lived at or about the time it was born.

The proofs that we have at our disposal that respiration has occurred are derived (1) from a careful examination of the lungs, and (2) from an examination of the stomach and intestines. The lungs of a newly born child that has respired are found to present anteriorly on opening the chest, overlapping the heart to a certain extent; they are bright pink and mottled, are crepitant to the touch, float entire, and when cut into small pieces, and attempts to completely empty the lung of air by pressure are useless. In the lung that has not respired the lungs do not present anteriorly when the chest is opened, are dull and of a brownish-purple, and sink in water. The stomach and intestines, or at any rate the stomach, of an infant that has breathed, contain air and float, whereas these organs in the fetus that has not respired sink, unless gases of decomposition cause them to float. This floating of the stomach and intestines is known as the second "life-test." Between these two conditions, which may be taken as typical extremes of inflation and non-inflation, there are any number of intermediate conditions of complete aëration, particularly in the first few days of life; and in addition there are two important exceptions to the statements I have made. The first exception is where the infant has respired but yet the lungs have all the characteristics of the fetal condition (complete atelectasis), and I remember an anencephalic monster that performed respiratory movements for some minutes, but yet the lungs were found in the fetal state *post mortem*. Cases also have been recorded in which this fetal condition of the lungs has been found in infants living from 36 hours to 4 days (Remer). A less marked condition of the fetal state persisting is where a portion or portions of the lungs are inflated, the rest being in the fetal condition (partial atelectasis), and slight degrees of this may be found in infants even of 5 or 6 months of age.

The converse condition is that in which the infant has never breathed, and yet appearances wholly or partly consistent with respiration have been found *post mortem*, produced by artificial respiration. It is to this class of case that I wish to direct your attention, and I first propose to quote some of the cases investigated, and then see how far these findings coincide with the views of others. The first three cases to be now mentioned occurred consecutively:

Case I.
A stillborn full-term fetus in which Silvester's method of artificial respiration and Schultze swinging were performed for one hour.

Case II.
A stillborn fetus of a woman with a contracted pelvis, in whom labour had been induced at the thirty-fourth week. Schultze swinging and mouth-to-mouth respiration were performed for about forty-five minutes.

Case III.
A stillborn fetus of the beginning of the ninth month. Mouth-to-mouth respiration was performed for half an hour.

In all these three cases the lungs were voluminous and presented anteriorly, they were pink and mottled, and the pleurae were glossy. They floated entire and in pieces. The stomach and intestines contained air and floated.

It is interesting to compare these three cases with two others:

Case IV.
A stillborn fetus, one of twins, from a case of Caesarean section in which artificial respiration could only be carried out for about ten minutes. Schultze swinging and mouth-to-mouth respiration were the methods employed.

Case V.
The twin fetus to Case IV in which no artificial respiration was performed.

In Case IV the lungs were only partially inflated, but the stomach contained air. In Case V the stomach and lungs contained no air, and sank in water.

I will now show you the actual specimens from some of these cases, but the first remark that must be made is that the colours you now see before you do not represent their appearance in the recent state, for the pink and mottled appearance of the inflated lung has to a great extent disappeared in the process of preserving and mounting the specimen, while the dull brown appearance of the non-inflated lung has become lighter on exposure to air, so that all three specimens of the lungs have somewhat the same colour.

The first specimen is a left lung from one of the first three cases mentioned (the other five lungs were cut up for the purposes of investigation), the second specimen is the partially-inflated lungs of the fourth case, and the third specimen the non-inflated lungs of the fifth case. The differences in volume are well seen, particularly if the upper lobes are compared, the three specimens showing a gradation from the fully-inflated down to the non-inflated condition. Under the microscope may be seen a piece of lung which was taken from the posterior portion of the lobe and floated after being subjected to pressure; the air vesicles will be seen to be distended. The last specimen is a stomach from one of these cases containing air.

Considering now these appearances in their relation to the views of other investigators on this subject, there seems to be no dispute as to the statement that there is no way of distinguishing lungs partially inflated artificially (as in Case IV) from those partially inflated naturally. There, however, does seem some variance of opinion as to whether by artificial respiration the lungs can resemble those of an infant that has fully respired. Thus Casper denies that the lungs become pink and mottled, and as an example of this type of case I mention a case of my grandfather's (Braxton Hicks) in which the lungs answered all the hydrostatic tests, but were pale fawn in colour and not mottled. Taylor, after a series of experiments, came to the conclusion that considerable force must be used in introducing the air. Further it has been maintained that the air in artificially-inflated lungs only reaches the bronchi and bronchioles and not the alveoli, so that pressure will squeeze out the air and the lungs will now sink in water. In my cases the lungs were certainly pink and mottled, the air was not introduced by any greater force than is employed in the orthodox midwifery methods for artificial respiration, and air was not expelled from the vesicles on pressure. Thus these findings agree most closely with those of Runge and Obolonsky, who found that, by the method of Schultze swinging, mottling and inflation of the air vesicles occurred, but while they state the inflation is only partial, I have found that in certain cases it is a total inflation. Further, it would seem that a simple method such as mouth-to-mouth respiration is capable of fully inflating the lungs (Case III), for Schultze swinging has been the one on which many investigators have based their conclusions.

Since, then, I hold the opinion that the appearances of complete respiration may be produced by artificial means, such a statement might be put forward as a defence in a case of infanticide, and I therefore propose to discuss how far such a defence could be considered a good one.

The points to be considered are:

1. Was it possible for the parturient woman alone to have carried out artificial respiration, or was there any one else there with her capable of doing it?
2. The method of artificial respiration employed.
3. The length of time the efforts at resuscitation were carried out.

As regards the time necessary to fully inflate a lung artificially I would submit that, by a comparison of Cases III and IV, twenty minutes is required at least, but for obvious reasons it is not possible to experiment with regard to a time limit in cases of stillbirth. It seems incredible also that a jury could be persuaded that the parturient woman had herself performed artificial respiration on her child at birth, even supposing such a simple method as mouth-to-mouth respiration was the means suggested as being employed, and even supposing she was a woman who had some knowledge of midwifery, namely, a midwife or monthly nurse. There is another type of case that might possibly give rise to difficulty, and the following is an example that I have met with:

A woman in poor circumstances with a large family, and therefore perhaps not likely to welcome an addition to it, was delivered while alone of what she stated was a stillborn fetus. The midwife, who had only been sent for a few minutes before birth took place, arrived in about ten minutes and proceeded, it is stated, to do artificial respiration for an hour. All the appearances in the lungs and stomach of respiration having occurred were present *post mortem*.

Now though there was no particular reason in this case to suspect infanticide or that the midwife was an accomplice, yet since there are now a large number of women trained as midwives and therefore able to state that they are capable of performing artificial respiration, there is,

in my opinion, a possibility of an unscrupulous midwife being able to be a party to infanticide and successfully to assist in defending the appearances found *post mortem* of complete respiration having occurred by a statement that she had performed artificial respiration for some time. The finding of changes in the skin and umbilical cord, or milk in the stomach, would of course negative her statements; but if the time when infanticide was committed was a short time after birth it might be difficult to prove the guilt of these people, and it was the case I have just mentioned that caused me to pursue the investigations I have laid before you. The conclusions I have therefore arrived at are as follows:

1. That lungs artificially inflated can resemble in every particular the lungs of complete respiration.
2. That the same statements hold good for the stomach and intestines.
3. That no excessive force in inflation is required to produce these effects, the ordinary midwifery methods being sufficient.
4. That a simple method, such as mouth-to-mouth inflation, will produce these appearances.
5. That for a lung artificially inflated to resemble a lung inflated by respiratory efforts, attempts at artificial respiration must have been carried out for at least twenty minutes.
6. That though as a defence in infanticide it may be urged that the appearances of normal respiration are due to artificial inflation, it would, however, be necessary to prove that (*a*) the party or parties charged were capable of performing the act of artificial inflation; (*b*) that the time was sufficiently long for inflation to have occurred; and (*c*), lastly, that no other signs of live birth were present.
7. That if all the conditions laid down are fulfilled (an event which I consider unlikely in a case of infanticide), there is no means of saying whether a child has normally respired or whether the appearances are due to artificial inflation.

In conclusion, I must express my indebtedness to Dr. Hebb and Dr. Bernstein for the *post-mortem* notes on some of the cases mentioned in this paper.

THE VARIATION IN THE SIZES OF RED BLOOD CELLS.*

By CECIL PRICE-JONES, M.B.Lond.,
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THE variations in diameter of the red blood cells are conveniently observed and measured with the help of a camera obscura, the image of the microscopic field being projected on to a table, when the individual cells can be outlined in pencil, and, if the apparatus is adjusted for a magnification of 1,000 diameters, the cells may be measured with a millimetre scale, and expressed in terms of fractions of μ. Observations are made on blood films stained by eosin methylene blue (Jenner's stain). The sizes of cells vary from 4 μ to 12 μ, and are classed in groups progressing from 4 μ by 0.25 μ up to 12 μ. It is found that in a series of successive 100 cells the distribution of these groups is not constant, but if the average diameter is calculated of each successive 100, the figures are very approximate (Table I).

TABLE I.—*Average Diameters of Successive 100 Red Cells.*

Normal.	Pernicious Anaemia.
μ 7·422	μ 8·150
7.425	8.355
7·390	8.127
7·355	8.175
7·390	8.212

I have employed this method of average measurements in making comparative estimations of blood cell diameters in different specimens of blood. In normal human blood the red cell diameter varies from 6 μ to 8.75 μ, and the average diameter of five successive 100 cells is 7.4 μ. In the blood of pernicious anaemia the diameter varied from 4 μ to 11.75 μ, and the average diameter of five successive 100 cells was 8·0 μ. In normal rabbit blood the red cell diameter varies from 5.0 μ to 8.0 μ, and the average diameter is 6.4 μ.

When a rabbit receives under the skin 10 c.cm. of a 1 per cent. solution of phenylhydrazine, the blood within twenty-four hours becomes brown and turbid, so that it is not possible to estimate correctly the haemoglobin per cent. and colour index. After six or seven days the brownness has disappeared and the blood is clear. It is then found to be very anaemic, 25 to 30 per cent. haemoglobin, and there is a markedly raised colour index. Similarly raised colour index is also observed in rabbit's blood after severe haemorrhage though to a less degree, and after slight haemorrhage it is not observed, or is negligible (Table II).

TABLE II.

Colour Index.	Phenylhydrazine.	Bleeding.
Before treatment ...	1·0 1·0 1·0	1.05 0·95 1.0
1 day after	—	1·2
3 days after	—	1.2
4 days after	—	1.2
6 days after	1·6	—
7 days after	1·5	1·2
8 days after	1.6	1·3
10 days after	1·3	1.15
13 days after	1·4	1·1
15 days after	1·2	1·1
30 days after	1.0	1.1

If measurements are made on successive days of the red blood cells of a rabbit that has been treated with phenylhydrazine, it is found that for the first two or three days the average diameter is diminished, but that on subsequent days it becomes very markedly greater (Table III).

TABLE III.—*Diameter of Red Cells after Phenylhydrazine.*

Days of the Month:	1	3	4	5	6	7	10	11	12
μ 4	μ —	μ 1	μ 1	μ 19	μ 5	μ 1	μ 1	μ —	μ 2
5	22	8	14	59	52	58	3	—	—
6	63	80	64	20	29	33	10	1	5
7	15	11	21	2	8	5	31	18	21
8	—	—	—	—	6	1	33	46	51
9	—	—	—	—	—	2	18	32	19
10	—	—	—	—	—	—	4	3	2
Average diameter ...	6·3	6.4	6·4	5·5	5·9	5·9	8·0	8·5	8.1

Inoculated.

Similar variations in diameter were observed in the blood of rabbits after a moderately severe haemorrhage, but to a much less degree (Table IV).

TABLE IV.—*Diameter of Red Cells after Bleeding.*

Days of the Month:	1	13	14	15	16	17	18	20	22	29
μ 4	μ —	μ —	μ 1	μ 1	μ 1	μ 2	μ 1	μ —	μ 1	μ 2
5	21	23	12	31	24	18	9	8	11	26
6	70	60	62	56	57	58	39	31	46	38
7	8	17	25	10	13	17	18	40	33	27
8	1	—	—	2	3	3	25	21	7	7
9	—	— A.	— B.	— C.	2	2	8	—	2	—
Average diameter... ...	6·3	6·3	6·2	6·5	6·7	6·4	7·2	7·2	6·7	6·2

A. bled 25 per cent., B. bled 20 per cent., C. bled 9 per cent. of total haemoglobin.

* Towards the expenses of this research a grant was received from the Science Committee of the British Medical Association.

It is also to be noted that this increase in diameter of the red cells is synchronous with the appearance of large numbers of polychromasic newly-formed red cells in the blood films.

Examination of films of bone marrow taken from rabbits killed at various dates after receiving phenylhydrazine, and after being bled, shows that the association of a raised colour index with increased diameter of red cell is connected with the formation of large nucleated red cells in the marrow. These cells, known as "metrocytes" or "mother cells," are not found in the marrow of normal animals; they are large cells 15 μ to 20 μ in diameter, with round or irregular contours, often showing poikilocytic processes suggesting amoeboid movement; the cytoplasm appears homogeneous and stains deeply oxyphile, or more usually is polychromasic and of a purple-grey colour. The nucleus is large and stained deeply basophile, and presents various states of activity and division to form "daughter cells" or "megaloblasts."

Table V shows the percentages of the various kinds of nucleated red cells in the marrow of rabbits at different dates after treatment by phenyl-hydrazin.

TABLE V.—*Analysis of Varieties of Nucleated Red Cells in Rabbit Bone Marrow after receiving 10 c.cm. 1 per cent. Phenylhydrazine Subcutaneously. (Twelve Rabbits.)*

	Number of Nucleated Red Cells per 100 White Cells.	Normoblasts and Primitive Erythroblasts.	Megaloblasts.	Metrocytes.	Free Nuclei.
		Per cent.	Per cent	Per cent	Per cent.
Normal ...	15	41	19	0	39
1 day ...	41	42	28	0	29
1 day ...	44	30	16	0	53
3 days ...	32	29	6	18	47
3 days ...	31	17	6	14	63
5 days ...	44	35	9	10	46
5 days ...	36	29	12	6	53
8 days ...	68	23	12	0.3	65
8 days ...	38	14	6	1 6	78
8 days ...	41	11	7	1 0	81
11 days ...	149	28	14	0 9	56
14 days ...	61	44	11	0	44
14 days ...	126	38	6	0	55

Incidentally it may be noted that these metrocytes are commonly found in the marrow of pernicious anaemia, where colour index and red cell diameter are also raised.

That these metrocytes divide to form megaloblasts, and the fact that many of the free nuclei found in the marrow of these animals seem to be megaloblast nuclei, suggest that the large-sized red cells have arisen from the immediate derivatives of metrocytes.

POLYCHROMASIA, AND THE PATHOLOGY OF HAEMATOMATA.

By G. R. Ward, M.R.C.S,
London.

In one of the most recent textbooks on diseases of the blood may be found the following statement:

> If blood, the erythrocytes of which are free from polychromasia, be defibrinated and kept in a sterile tube for four or five days and then re-examined, polychromasia will be found in many cells.

I am not concerned to dispute this statement, but to criticize the experiment upon which it is based and the deduction drawn therefrom—namely, that polychromasia is a change degenerative in nature. Defibrination is so gross a tampering with a tissue of such peculiar delicacy that it is impossible to disregard its influence. It is, therefore, basing argument on false analogy to argue the degenerative nature of *intra vitam* polychromasia from a consideration of changes produced by so damaging a process. When we consider that, in addition to this, the blood was kept *in vitro* for some days, the invalidation of the deduction quoted is only too plain. But since there is no such thing as a perfectly isolated, absolutely ineffectual action, we may be sure that there is some deduction to be drawn from this experiment. What, then, does it prove? Only that, if red corpuscles are kept for some days under conditions likely to prove prejudicial to vitality, some of them will show an alteration of chemical constitution which may be demonstrated as "polychromasia." We are, then, forced to observe that this change cannot depend only on the surroundings, for these were the same for all the corpuscles, while only some became polychromatophile. Where, then, lay the deciding factor? Presumably in the corpuscles themselves; no other solution appears to be possible. Thus we are forced to the conclusion that some of these corpuscles were potentially polychromatophile even before being subjected to experiment, or, to put it another way, even in normal blood polychromasia may be demonstrated under suitable conditions. This would appear to be a legitimate deduction from the experiment; but there is nothing here to suggest that the essential bio-chemical difference so demonstrated is in the nature of a degeneration.

With such considerations as a stimulant I examined the blood in haematomata following accidental and surgical injuries. In these the blood had been indeed removed from the circulation, but not from the body. The "living test tube" experiment which one finds dealt with in textbooks of physiology offers a close analogy; and, as in this case, the blood was not found to be clotted. Corpuscles under these conditions would naturally be deprived of opportunity of exercising their normal functions; changes from disuse atrophy might be expected to ensue and finally death. As the conditions were the same for all corpuscles one looked for changes affecting all; wondering, at the same time, whether polychromasia would be amongst them, for only universal polychromasia would afford evidence of its degenerative nature. But again, as in the experiment first alluded to, polychromasia, when present, affected only a few corpuscles. There were, nevertheless, various changes affecting all the corpuscles.

We find, then, that neither under the conditions of the first experiment nor under the more natural ones of the second, does the death of a corpuscle *per se* lead to a polychromatic reaction. Does this reaction, then, depend on the age of the corpuscle? Apparently not, for if it did we ought to find it in fresh drawn normal blood. It might be argued that cells about to become polychromatophile are removed from the blood, but we find that this does not take place even when blood destruction is at its greatest—as in pernicious anaemia.

If, on the other hand, polychromasia were due to the youth of the cell, we ought to find it in normal bone marrow, which is not the case. The fact that this change is found in the young of certain animals is much more easily explained by supposing a congenital variation as its origin. The full development of the adult haemopoietic organs is not reached at the moment of birth; what more natural than that we should find in the young signs of a slightly differing activity?

If, then, we adopt as a hypothesis that there is a certain difference in the composition of the red corpuscles, congenital in origin and capable of being demonstrated under certain conditions as polychromasia, we can explain facts which did not at first appear to harmonize.

I call it a "certain difference" because I do not wish to be understood as representing it to be an abnormality. Polychromasia is potentially present in normal blood, and may be demonstrated if the blood be first treated in a particular way—for example, by defibrination, etc.—in the first experiment and by deprivation of normal surroundings in the second. It is noteworthy that the more unnatural conditions always rendered it demonstrable, the natural only occasionally, usually after ten or twelve days.

In pathological conditions we may suggest that the potentiality is increased as the erythroplastic activity reverts to a more primitive type (for example, in regeneration), or, in other cases, that conditions—for example, of toxaemia—act as did the defibrination by rendering it more easily demonstrable; and polychromasia should be interpreted accordingly.

To sum up, I suggest as a working hypothesis that even in normal blood the corpuscles, as they show differences in size, in haemoglobin content, in isotonicity, show another difference known as polychromasia; that this difference

may be aggravated by conditions inimical to normal haemogenesis; and may be rendered more easily demonstrable when the corpuscles are subjected to unnatural conditions. I further suggest that normal adult haemogenesis produces this difference in a minimal degree, so that the incidence of other factors is necessary to its demonstration; and that it is to be expected in the blood stream in demonstrable degree when the marrow is of primitive type, either by reversion or lack of development.

If this hypothesis be employed, considerations of the significance of polychromasia from a clinical point of view should be much simplified.

As regards the changes noted in all corpuscles in haematomata, they were as follows:

1. The blood was fluid, sometimes viscid, never coagulated.
2. On standing the corpuscles separated out.
3. Rouleaux formation was absent or very defective.
4. The leucocytes showed fragmentation of the nucleus —in some cases they were increased and in some were engulfing red corpuscles.
5. Crenation was absent.
6. Fragmentation was not present, but was very easily produced.
7. Loss of elasticity was most pronounced, and for this reason the examination of spread slides was only possible if the haematomata were opened early.
8. Haemoglobinaemia was absent.
9. The intensity of staining reaction as contrasted with normal blood was impaired.
10. These changes were apt to be accentuated in the older cases.

Such were some of the changes noted. I shall hope at a later date to have the opportunity of examining a larger number of cases and of making a more detailed and comprehensive report on them.

THE ACTION OF OLEIC ACID AND ITS SOAPS ON THE BLOOD.*

By A. E. BOYCOTT.

(From the Pathological Department, Guy's Hospital, London.)

BEGINNING with the discovery of an ether-soluble haemolytic substance in *Bothriocephalus* and its identification as a cholesterin-ester of oleic acid, some importance has been attached to the presence of such substances, either in the lumen or in the wall of the alimentary canal, as being the effective cause of both helminthic and idiopathic pernicious anaemia.[1] It is, however, a far cry to transfer the results obtained *in vitro* with substances prepared from intestinal contents to the explanation of the production of anaemias *in vivo*. Soaps of oleic acid, for example, are haemolytic enough, but there are reasons for supposing that they are really foreign to the economy and do not occur in the body except as the result of direct experimental introduction.[2] Their haemolytic action *in vitro* is conditioned by a variety of circumstances,[3] which make it difficult to predict what their action in the body would be; in particular, their concentration and the simultaneous dresence of various other substances have to be taken into consideration. It seems likely, indeed, that a good deal of soap might be present in the circulating blood without causing haemolysis. It is certainly not difficult to show that the haemolytic effect of sodium oleate on fresh defibrinated rabbit's blood *in vitro* may be very much greater than that produced by the injection of corresponding amounts into the jugular vein of the anaesthetized animal. As regards the production of anaemia it seems necessary that the occurrence of blood destruction should be established, as well as the presence of haemolytic substances in the neighbourhood. While it is known that idiopathic pernicious anaemia is associated with excessive haemolysis, it is not clear that this obtains in *Bothriocephalus* anaemia, and it is known that abnormal blood destruction does not occur in *Ankylostoma* anaemia.[4]

The question seems, therefore, to be primarily one of direct experiment, and Faust[5] has described how, by feeding two dogs with oleic acid and repeatedly injecting two rabbits with sodium oleate, he produced a marked degree of anaemia, and ultimately death. The immediate object of the present experiments has been to repeat these observations, with the addition that the total amount of haemoglobin has been determined, as well as its concentration in the circulating blood. It is obvious that the fall in the percentage of haemoglobin and in the number of red cells per cubic millimetre observed by Faust might, at any rate in part, have been due to a dilution of the blood.[6]

Seven rabbits were treated by the repeated subcutaneous injection of soap solution.† Daily observations were made of the percentage haemoglobin content of their blood, and stained films were also examined frequently. The animals were finally killed and their total haemoglobin determined by Welcker's method. The results are shown in Tables I and II.

TABLE I.

No. of Rabbit and Sex.	Average Body Weight in Grams.		Average Haemoglobin per Cent. of the Human Scale.		Treatment.
	Before.	At End.	Before Treatment.	During Last Week Before Death.	
3. F.	2075	2140	90	64	5 doses of 10 c.cm. 5 per cent. potassium oleate in 10 days = 2 5 grams.
4. F.	2080	1890	79	46	5 doses of 20 c cm. 5 per cent. potassium oleate in 10 days = 5 grams.
5. F.	2785	2540	75	66.5	14 doses of 1 c.cm. 10 per cent. sodium oleate in 30 days = 1.4 grams.
6. F.	2935	2695	74	62	13 doses of 1 c cm. 10 per cent sodium oleate in 30 days = 1.3 grams.
9. F.	2595	2310	70.5	56	13 doses of 1 c.cm. 10 per cent. sodium oleate in 30 days = 1.3 grams.
11. F.	2545	2555	81.5	64	13 doses of 5 c.cm. 10 per cent, sodium oleate in 30 days = 6.5 grams.
12. F.	2615	2655	78.3	70.5	14 doses of 5 c cm. 10 per cent. sodium oleate in 30 days = 7 grams.

TABLE II

No. of Rabbit	Total Haemoglobin in c cm. Oxygen Capacity.	Blood volume c.cm.	Per 100 Grams Initial Weight.		Per 100 Grams Final Weight.	
			Oxygen Capacity.	Blood Volume.	Oxygen Capacity.	Blood Volume.
3.	14.4	114	0.70	5.5	0.68	5.3
4.	9.55	115	0.46	5.5	0.505	6.1
5.	15.6	133	0.56	4.8	0.59	5.0
6.	14.6	123	0.50	4 2	0.54	4.6
9.	11 0	114	0.42	4.4	0.475	4.9
11.	14.6	117	0 57	4.6	0.57	4.6
12.	16.0	116	0.61	4 5	0 60	4.4
			0 55	4 8	0.57	5.0

For comparison with these results we give also the figures for the total haemoglobin and blood volume obtained by the same method in a series of ten normal rabbits of about the same size (see Table III).

In all seven animals there was a fall in the percentage of haemoglobin, though in two instances (5, 12) this was not very great, and in only one case (4) was the figure reached lower than may be found in normal rabbits. The blood volume was normal, or somewhat increased. The total quantity of haemoglobin in the body was definitely less than normal in at least three animals (4, 6, and 9), and on the whole was deficient by about one-fifth. This result might be due either to increased destruction, deficient formation, or a combination of both factors. The

* The expenses of this work have been defrayed by grants from the British Medical Association and from the Royal Society.

† Made by neutralizing the impure oleic acid known as "Kahlbaum II."

TABLE III.

Sex.	Weight in Grams.	Haemoglobin per Cent.	Total Haemoglobin in c.cm. Oxygen Capacity.	Blood Volume, c.cm.	Per 100 Grams Body Weight.	
					Oxygen Capacity.	Blood Volume.
M.	1970	91	14.6	87	0.74	4.4
M.	2170	94	19 5	113	0.90	5 2
M.	2550	75	15.8	113	0 62	4 45
M.	2350	85	16 1	103	0 685	4 4
F.	2050	71	12.7	90	0.62	4 4
F.	2140	90.5	17 5	105	0,82	4 9
F.	2400	68	14.8	117	0 615	4.9
F.	2220	73	15.1	111	0 68	5 0
F.	2400	83	14.6	96	0 61	4 0
F.	2360	77	13 2	92	0 56	3 9
					0.685	4.6

signs of excessive blood destruction in the urine and organs (liver, spleen, kidneys, lymphatic glands) of rabbits have been described elsewhere.[7] The sum of these observations was to the effect that when a rabbit makes away with a large quantity of rabbits' red cells, the processes involved are an exaggeration of those normally at work. It was also pointed out that blood destruction is naturally so active in the rabbit that a moderate increase is difficult to diagnose from the examination of the urine during life, or of the organs after death. In the present series of animals, nothing could be found which definitely indicated any excess of blood destruction, but, owing to the circumstances which have been mentioned, this cannot be taken as showing that an amount of blood equivalent to the deficiency shown in the Welcker figures had not been destroyed. There is, however, clear evidence that the somewhat anaemic state to which these rabbits were reduced was not entirely due to blood destruction. At no stage in the experiments did their blood show any histological signs of active regeneration of red cells. To any one familiar with the appearances, these signs are easy to detect after removal of quite small amounts of blood by bleeding, and especially if the blood is destroyed inside the body by such agents as saponin, distilled water, aniline, phenylhydrazine, and the like. Regeneration was therefore defective; whether destruction was going on at an abnormally fast rate is uncertain.

The *post mortem* findings at the seat of inoculation were somewhat remarkable. Considerable solid masses of soap still remained unabsorbed, mixed with a clear or somewhat turbid liquid; histologically, there were great quantities of leucocytes, with some necrosis of the subcutaneous tissues. In most cases no definite abscess was present. In two animals, however (4 and 9), the subcutaneous mass was observed to increase in size rapidly for three or four days before death, and on *post-mortem* examination frank suppuration was found. One is inclined, therefore, to think that the soap injected was absorbed only in small part or not at all, and that the effects observed in the blood were due to inhibition of regeneration by the influence on the general health of the animal of the necrotic and inflammatory processes occurring locally rather than to any direct haemolytic effect of the inoculum. It is perhaps

TABLE V.

No.	Duration of Feeding.	Sex.	Weight in Grams.	Total Haemoglobin in c.cm O_2 Capacity.		Blood Volume		Haemoglobin per Cent. of Human Scale.
				C.cm.	Per Cent. of Weight.	C.cm.	Per Cent. of Weight.	
1	30 days	M.	111	1.00	0 90	6 35	5.7	85
2	,,	F.	127	1.27	0.90	6.8	5.4	91
3	,,	F.	81	0.74	0.845	4 9	6 0	81
4	,,	F.	62	0.70	1.04	4.1	6.1	93
5	48 days	F.	79	0.73	0 93	4 5	5.7	88
6	,,	M.	103	1.125	1 095	6.7	6 5	91
7	50 days	F.	119	1.21	1.01	6 9	5.8	94
8	,,	M.	85	1.11	1.31	7.35	8 6	82
9	,,	M.	97	1.07	1.10	5.7	5 9	95
10	,,	M.	85	0.90	1.06	5 8	6.8	84
Average ...			96		1 02		6.25	88

significant that the animals (4 and 9) in which the local condition was most exaggerated were those in which the deficiency of haemoglobin was found to be greatest.

Attempts were made to treat animals by repeated intravenous inoculations, but without success. Soap solutions are so irritating and cause such extensive

TABLE VI.

No.	Sex.	Weight in Grams.	Total Haemoglobin in c.cm. O_2 Capacity.		Blood Volume.		Haemoglobin per Cent. of Human Scale.
			C.cm.	Per Cent. of Weight.	C.cm.	Per Cent. of Weight	
1	F.	116	1.22	1 05	7.1	6 1	93
2	M.	83	0.72	0.87	5 39	6.5	75
3	M.	110	0.92	0.84	6.7	6.1	74
4	F.	83	0 86	1.03	5.4	6.5	86
5	F.	100	0 93	0.93	6.2	6 2	81
6	F.	83	0 87	1.04	5.2	6 3	90
7	F.	90	1.00	1.11	6 3	7.0	86
8	.	102	1.05	1.03	8 0	7.8	71
9	M.	81	0 80	0 99	5.4	6.6	81
10	F.	97	0 90	0.92	5 25	5.4	88
Average ...		94.5		0.98		6.45	82 5

local thrombosis that the injections cannot be repeated very frequently. Large quantities given in one injection kill the animal almost at once.[8] Intravenous injections of emulsions of oleic acid in saline have no apparent effect on the red cells.

Four rabbits were fed, the oleic acid being mixed with their food in quantities as great as they would tolerate. They evidently

TABLE IV.

Sex.	Total Haemoglobin in c.cm. O_2 Capacity.	Blood Volume, c.cm.	Body Weight in Grams.		Haemoglobin per Cent.		Total Haemoglobin per Cent. of Weight in c.cm. Oxygen Capacity.		Blood Volume per Cent. of Weight.	
			Initial.	Final.	Initial.	Final.	Initial.	Final.	Initial.	Final.
A. (M.)	14.95	119	2410	2330	76	75	0.62	0.64	4.95	5.1
B. (M.)	7.7	63	1930	1540	80	76	0.40	0 50	3.2	4.1
C. (M.)	7.4	55	1330	1170	84	69	0.56	0.63	4.2	4.7
D. (M.)	14.3	118	2270	2355	78	65	0.63	0.62	5.2	5.0

did not like it. Animals A. and B. were so fed for sixty-five days, C. and D. for forty-three days, about 2 lb. of oleic acid being given in all. The animals were finally treated by the Welcker method. The total haemoglobin and blood volume are calculated on their body weights before feeding and on their average weight during the last week of the experiment.

Rabbit B. alone shows any material deficiency; this animal lost weight a great deal (20 per cent.), and the whole effect may well have been due to general malnutrition owing to its food being distasteful; nothing abnormal was found *post mortem*. No evidence of excessive blood destruction or active regeneration was found in any of these four animals. (See Table IV.)

A further series of experiments was made by feeding rats with oleic acid; they seemed to like it as little as the rabbits. The results of the Welcker determinations are given in Table V.

Similar determinations were made on a series of similar rats kept as far as possible under identical conditions except that they were not fed with oleic acid. (See Table VI.)

There is no suggestion here that the rats fed with oleic acid have less haemoglobin than the controls. There were no signs of active regeneration in films taken when the animals were killed.

SUMMARY.

1. Rabbits repeatedly inoculated with soaps of oleic acid subcutaneously become anaemic. Blood regeneration is defective; there is no clear evidence that blood destruction is excessive.

2. Rats fed with oleic acid showed no changes in the blood.

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THE PATHOGENESIS OF HEREDITARY HAEMOPHILIA.

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[*Abstract.*]

TWELVE cases were investigated. In all of them the coagulation of the blood was delayed. In those in whom the symptoms were most marked the blood took an hour or more to coagulate; in one case in whom the tendency to prolonged haemorrhage was less marked the coagulation time was thirty six minutes, and in the slight cases it was about a quarter of an hour. This delay in coagulation is the only pathological factor which is constantly present, and it is in itself sufficient to explain all the symptoms. There are good grounds, therefore, for regarding it as the proximate cause.

For the purpose of investigating into the reason of this delayed coagulation, blood was drawn into oxylate solution from the veins of normal and haemophilic persons, and after the subsidence of the corpuscles the plasma was pipetted off. Fibrinogen solutions were prepared by diluting the plasma with water, neutralizing with CO_2, and dissolving the centrifuged deposit in normal saline. Thrombin was made by expressing the fluid from the clot formed when calcium was added to fibrinogen. Thrombokinase was extracted from human tissues. Prothrombin was prepared by adding a minimal amount of thrombin to a fibrinogen solution, and expressing the fluid from the clot.

The first step was to determine whether the delay occurred during the first or the second stage of coagulation—that is, in the formation of the thrombin or in the action of the thrombin on the fibrinogen. It was found that haemophilic thrombin was as active as normal thrombin and that haemophilic fibrinogen was as readily coagulated as normal fibrinogen, but that the rate of formation of thrombin in haemophilic fibrinogen solution was much slower than in normal fibrinogen solution. The delay was therefore in the formation of thrombin. This might have been due to the presence of a substance which had a deterring influence on the process, but no such body was found, and haemophilic plasma did not inhibit the coagulation of normal plasma.

The cause was therefore to be looked for in connexion with the calcium, the thrombokinase, or the prothrombin. Varying quantities of calcium were added to haemophilic plasma, but no amount reduced the coagulation time to normal. Calcium was, therefore, not the cause.

With varying amounts of thrombokinase the same result was obtained, except when very large quantities were added, when coagulation was almost instantaneous in both normal and haemophilic plasmas. But with lesser amounts, even such as were sufficient greatly to accelerate the coagulation of normal plasma, the coagulation of the haemophilic plasma still took much longer than the normal. Further, there was found to be as much thrombokinase in haemophilic serum as in normal serum, and as much could be extracted from haemophilic blood corpuscles as from normal corpuscles. Thrombokinase was, therefore, not the cause.

There was no quantitative deficiency as regards the prothrombin in haemophilic plasma, but a qualitative difference was present, which showed itself in the unduly long time required by the haemophilic prothrombin to change into thrombin in the presence of calcium and thrombokinase. That this fault in the prothrombin was the sole cause of the delay in coagulation was shown by the fact that very small quantities of normal prothrombin when added to haemophilic plasma reduced the coagulation time to the normal.

The cause of haemophilia is, therefore, an inherited peculiarity in the constitution of the prothrombin whereby its activation into thrombin is retarded.

DISCUSSION.

Professor SAHLI (Berne) said that, as all present knew, he had found that the diminution of the coagulation power was a constant characteristic of haemophilia, and this was due to lack of thrombokinase. Traces of normal blood, if added to haemophilia blood, restored the coagulation power forthwith. In a later paper (*Arch. für inn. Mediz.*) he had shown that the difference between normal and haemophilic blood resided in the blood corpuscles. Normal blood corpuscles, even after careful washing, had a strong coagulating effect on haemophilic blood. His final conclusion, therefore, was that haemophilia was a cellular anomaly both of the blood corpuscles and the endothelial cells of the vessels.

ON THE ABSENCE OF ALTMANN'S GRANULES FROM CELLS OF MALIGNANT NEW GROWTHS

(Second Communication.)

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I.—INTRODUCTION.

IN the paper published last year[1] in this JOURNAL, attention was especially directed to the fourth of the following conclusions which had been recently arrived at.[2]

1. Most kinds of normal cells contain Altmann's granules, squamous epithelium and unstriped muscle constituting the chief exceptions.
2. In inflammatory conditions these granules are present in the various cell species concerned.
3. In innocent new growths these granules are present.
4. In malignant new growths these granules tend to disappear, or are absent entirely, from the particular type of cell involved.

A brief account was given of the granules occurring in normal cells, of which a few types were figured; certain inflammatory conditions were mentioned as having been investigated with the result that granules were found to be present in all; and a description as regards granules was given of new growths, based upon an examination of 52 cases, 12 of which were non-malignant. Illustrations were also given of primary and secondary carcinoma showing groups of agranular cancer cells surrounded by granule-containing lymphocytes, plasma cells and other cells.

The number of cases of new growth has now been brought up to 117, and the conclusions already arrived at have been amply verified; these are now extended by the enunciation of a histological test for malignant disease formulated at the end of the present article.

II.—NORMAL TISSUES.

As indicated above, the chief exceptions to the general rule that normal cells contain Altmann's granules are

squamous epithelium and unstriped muscle. The collecting tubules of the kidney are also almost or entirely free from granules, but the first two are of fundamental importance on account of the large number of new growths into whose composition they enter, since opinions as to malignancy of a given tumour cannot be based upon the non-appearance of granules which are not present in the cells in which the tumour originated. It may be noted [3] that in the early mammalian embryo the cells representing all three cell-species just mentioned show granules, but that these disappear during late embryonic and early extrauterine life. Though fibroblasts contain fairly numerous small granules, their product, white fibrous connective tissue, usually shows none. Granules may be still present, however, although minute and few in number, in the connective-tissue corpuscles even when fibrillation has advanced to a very marked extent. Fig. 1 illustrates a normal tissue—it is chosen especially as showing normal granule-containing columnar epithelium which on becoming cancerous loses its granules (cf. Fig. 2).

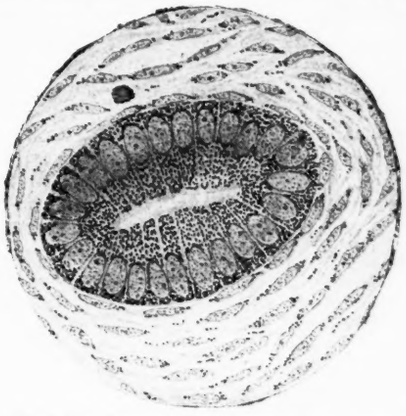

Fig. 1.—Normal endometrium. Granules are present in the columnar epithelium of the tubules, as well as in the cells of the surrounding tissue. Contrast presence of granules in normal endometrial epithelial cells in this figure with absence of granules from cancerous endometrial epithelial cells shown in Fig. 2.

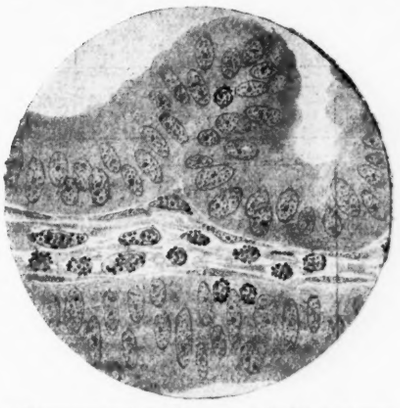

Fig. 2.—Columnar-cell carcinoma of body of uterus. Granules are absent from the cancer cells; the stroma is infiltrated with granule-containing lymphocytes and plasma cells. Three lymphocytes, mapped out by their granules, are seen invading the cancerous epithelium. Contrast with Fig. 1.

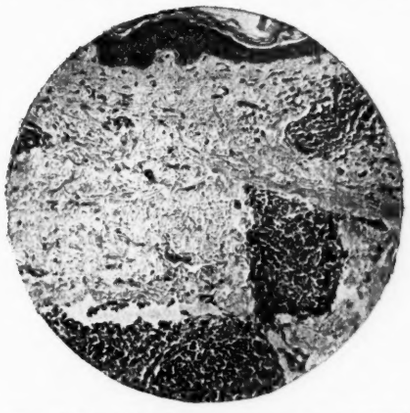

Fig. 3.—Mycosis fungoides (skin). Low power photomicrograph. Section shows small round cells; note similarity to Fig. 5. In this case, however, *granules are present*. (See Fig. 4.)

Fig. 4.—Small portion of section illustrated in Fig. 3, highly magnified. Note presence of granules as in lymphocytes. (Zeiss apochromatic objective $\frac{1}{12}$ in., compensating ocular No. 4.)

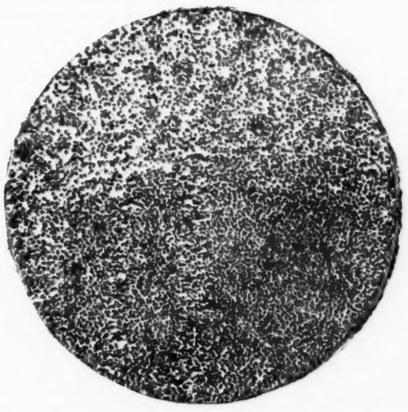

Fig. 5.—Lymphosarcoma (rectum). Low power photomicrograph. Section shows small round cells; note similarity to Fig. 3. In this case, however, *granules are absent*. (See Fig. 6.)

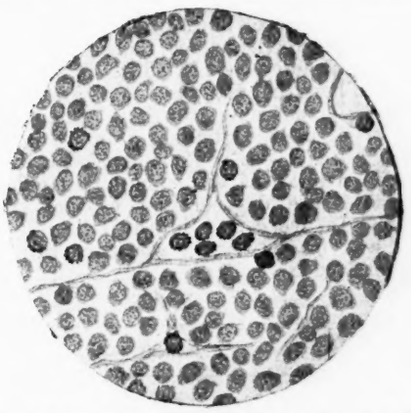

Fig. 6.—Small portion of section illustrated in Fig. 5, highly magnified. Note absence of granules from sarcoma cells, and presence of twelve lymphocytes marked out by their granules. Compare with Fig. 2, and contrast with Fig. 4.

III.—Inflammatory Conditions.

The following cases have been added to those mentioned in last year's paper, and are tabulated for the sake of comparison with the cases of new growth. The proportion of cells containing granules is indicated in the following scheme (p. 1424), and the cells referred to are those characteristic of the conditions named—namely, lymphocytes, plasma cells, and fibroblasts in inflammatory conditions generally, and, in tuberculous conditions, giant cells and endothelioid (or epithelioid) cells, in addition to the foregoing.

The fifth and seventh cases are of special interest. In the former a piece of tissue was removed on a diagnosis

Percentage of Cells containing Granules.	Indicated by
0-10, *i.e.*, about 0	0 0 0 0 0
10-30 ,, ,, 20	+ 0 0 0 0
30-50 ,, ,, 40	+ + 0 0 0
50-70 ,, ,, 60	+ + + 0 0
70-90 ,, ,, 80	+ + + + 0
90-100 ,, ,, 100	+ + + + +

Situation.	Nature.	Granules.
Omentum ...	Tuberculosis (miliary)	+ + + + +
Skin of arm ...	Tuberculosis (lupus)	+ + + + +
Ovary	Tuberculosis (massive)	+ + + + +
Abdomen ..	Fibroma	+ + + + +
Leg	Inflammatory (?gumma)	+ + + + +
Glands of neck ...	Tuberculosis (massive)	+ + + + +
Skin	Mycosis fungoides...	+ + + + +
Glands of neck ...	Tuberculosis (massive)	+ + + + +

of (?) gumma (?) sarcoma, and although the general opinion of many who have examined a section stained with haematoxylin and eosin is that it shows inflammatory changes only, yet others have pronounced in favour of sarcoma. The granule findings, however, as given above, contrast markedly with those obtaining in the cases of spindle-cell sarcoma given in the table of new growths below. In the latter the patient has numerous cutaneous nodules on trunk, head, and limbs, and the case has been diagnosed variously as mycosis fungoides and sarcomatosis cutis. The distribution of the nodules, the duration of the disease (several years), and the amenability to treatment (rapid disappearance of any given nodule under *x* rays) indicate inflammatory rather than malignant disease. Examined histologically by ordinary staining, the tumour presents simply the appearances of an aggregation of lymphocytes or of a lymphosarcoma; but while an undoubted case of lymphosarcoma (see table below) shows absence of granules, in this case granules are present, as indicated above (Figs. 3-6).

IV.—The New Growths

The granule appearances of additional cases of new growth investigated during the past year is given in the following tables. The proportion of cells containing granules is indicated as in the scheme given above; the cells referred to here, however, are only the essential cells of the new growths named, no account being taken of the granule-containing cells found in the stroma. It may be mentioned here that the absence of granules from the cells of a malignant new growth is seldom absolute, but the number of cells containing granules is usually not more than about 1 per cent., and such cells as contain granules often show at the same time indications that these granules are degeneration products of the cell protoplasm. In every case in the following tables the diagnosis was made without reference to the granule appearances found:

1. *Non-malignant New Growths.*

Situation.	Nature.	Granules.
Thyroid	Adenoma	+ + + + +
Breast	,, ...	+ + + + 0
Parotid	Non-malignant endothelioma ...	+ + + + 0
Uterus	Hydatidiform mole	+ + + + +
Rectum	Polypus	+ + + + 0
Thigh	Lipoma	+ + + + +
Epididymis ...	Fibrochondroma	+ + + + +
Thyroid	Adenoma	+ + + + +
Rectum	Polypus	+ + + + +

2. *Spheroidal-cell and Columnar-cell Carcinoma.*

Situation.	Nature.	Granules.
Breast	Spheroidal-cell carcinoma ..	0 0 0 0 0
,, ...	,, ,, ...	0 0 0 0 0
,, ...	,, ,, ...	0 0 0 0 0
,, ...	,, ,, ...	0 0 0 0 0
,, ...	,, ,, ...	0 0 0 0 0
,, ...	,, ,, ...	0 0 0 0 0
,, ...	,, ,, ...	0 0 0 0 0
Skin (?secondary)	,, ,, ...	+ + + 0 0
Breast	,, ,, ...	+ 0 0 0 0
Corpus uteri ...	Columnar-cell carcinoma ...	0 0 0 0 0
Caecum	,, ,, ...	0 0 0 0 0
Rectum	,, ,, ...	+ 0 0 0 0
Corpus uteri ...	,, ,, ...	0 0 0 0 0
Rectum	,, ,, ...	0 0 0 0 0
,, ...	,, ,, ...	0 0 0 0 0
Sigmoid	,, ,, ...	0 0 0 0 0

3. *Endothelioma.*

Situation.	Nature.	Granules.
Breast	Lymphatic perienthelioma ..	0 0 0 0 0
Orbit	,, enthelioma	0 0 0 0 0
Breast	Perienthelioma	0 0 0 0 0
,, ...	Lymphatic perienthelioma ..	0 0 0 0 0
Hand	Endothelioma	+ + + 0 0
Breast	Perienthelioma	0 0 0 0 0
,, ...	Lymphatic perienthelioma ...	+ + 0 0
,, ...	,, perithelioma ...	0 0 0 0 0
,, ...	Perienthelioma	+ + + 0 0
Cervix uteri ...	Lymphatic enthelioma	0 0 0 0 0
Breast	Perienthelioma	0 0 0 0 0
,, ...	,, ...	0 0 0 0 0
Rectum	Endothelioma	0 0 0 0 0
Tongue	Lymphatic enthelioma	0 0 0 0 0
Breast	,, ,, ...	0 0 0 0 0

4. *Sarcoma.*

Situation.	Nature.	Granules.
Leg	Spindle-cell sarcoma	0 0 0 0 0
Breast	Large round-cell sarcoma... ...	0 0 0 0 0
Leg	Melanotic sarcoma	0 0 0 0 0
Rectum	Large round-cell sarcoma	0 0 0 0 0
Groin	Spindle-cell sarcoma	0 0 0 0 0
Rectum	Lympho-sarcoma	0 0 0 0 0
Fibula	Myeloid sarcoma*	0 0 0 0 0

* Granules present in giant cells.

The above tables show at a glance the granule findings in the chief groups of new growths, and shows well the contrast between malignant and non-malignant neoplasms. A detailed table of all the new growths examined during the past year is given in the *Archives of the Middlesex Hospital*, Ninth Cancer Report, 1910; it includes also groups which may here be briefly remarked upon as follows:

5. *Squamous-cell Carcinoma* (11 cases) *and Rodent Cancer* (2 cases).—These are purposely omitted from the above tables, since Altmann's granules are absent from squamous epithelium (except very occasionally and in small numbers in the basal layer), so that one cannot in

the case of new growths originating in this epithelium speak of disappearance of granules, or regard absence of granules as indicating malignancy.

6. *Teratoma* (3 cases).—Granules are present in these as in normal tissues; thus, at a spot at which there is an abrupt transition from ciliated columnar epithelium to stratified squamous epithelium, the change from numerous fine granules to absence of granules obtains as normally.

7. *New Growths of Ovary* (3 cases) *and Thyroid* (1 case) diagnosed on ordinary histological examination as malignant show presence of granules, except in one instance (columnar-cell carcinoma of ovary). In last year's paper there is already an indication that new growths of these organs are anomalous, those which are histologically malignant being malignant clinically only in a limited sense. Possibly the absence of granules in the exceptional case just mentioned indicates that it was a secondary and not a primary growth of the ovary.

8. *New Growths of Doubtful Histology* (5 cases).—In some of these presence, in others absence, is the marked feature. In one case the diagnosis actually made was "carcinoma of rectum on macroscopic grounds; no histological evidence"; subsequent examination for granules supported a diagnosis of malignancy.

Among the spheroidal-cell carcinomata tabulated above, the growth in which a majority of the cells contained granules was removed on a diagnosis of "(?) secondary nodule" from the skin of the abdomen of a patient whose breast (of the side opposite to that on which the nodule was situated) had been removed eleven years previously. The presence of granules here may perhaps be correlated with the inordinate length of time elapsing before the appearance of metastases.

In columnar-cell carcinoma of the intestine it has generally been found that the normal looking epithelium in the neighbourhood of the new growth is free from granules. The reason of this—proximity of malignant new growth, pre-cancerous condition, or other cause—is not obvious; in one instance, however, there was an abrupt change in a section from granule-containing epithelium of normal appearance to cancerous epithelium devoid of granules.

The Sarcomata.—In all the different types of sarcoma examined absence of granules is a very marked feature. In the case, however, of myeloid sarcoma of the fibula the giant cells are for the most part crowded with minute granules, and stand out in striking contrast to the surrounding agranular cells. The presence of these granule-containing cells, although comparatively few in number, is suggestive in connexion with the low degree of malignancy of myeloid sarcoma. (It may be remarked here that the almost exact converse of this condition obtains in a case of lymphadenoma. Here the section generally is full of granules, but from most of the somewhat sparsely distributed several-nucleated cells granules are absent.) It is especially important in connexion with the sarcomata to bear in mind, when examining a section for granules, that these are absent from unstriped muscle and from fully organized "white fibrous" connective tissue. Fibroid tumours occurring in various situations, and in particular fibromyomata of the uterus, may be instanced in this connexion.

V.—Conclusion.

On reviewing the results of examination of the various tissues mentioned in the foregoing, it is seen that the conclusions arrived at a year ago are fully confirmed, numerous additional examples of inflammatory tissues and new growths of not only the same but also new varieties falling into line with those already described. These conclusions may now be carried a step further. Setting aside new growths originating in cells not normally containing Altmann's granules, the status of neoplasms from whose cells granules are practically absent is quite clear; these belong to the group of undoubtedly malignant new growths. The position of those neoplasms in which presence of granules is the conspicuous feature is not quite so plain; most of those examined are definitely non-malignant, while growths originating in the ovary and the thyroid body admittedly present anomalous features in respect of malignancy. On the whole it appears that the absence or presence of Altmann's granules may be used as a histological test ("granule test") for malignant disease and other conditions as follows:

1. Excluding new growths originating in cells not normally containing Altmann's granules, absence of granules from all or nearly all the essential cells of a new growth indicates malignancy.

2. Presence of Altmann's granules in all or nearly all the essential cells of a new growth is usually associated with non-malignancy or only with malignancy of a special kind or limited degree (cf. thyroid, ovary).

3. In a tumour the diagnosis of which lies between inflammation and sarcoma, presence of Altmann's granules indicates the former, absence the latter.

References.

[1] British Medical Journal, September 25th, 1909. [2] *Archives of the Middlesex Hospital*, Eighth Cancer Report, 1909, p. 191. [3] Ibid., Ninth Cancer Report, 1910, p. 110.

CHLOROFORM NECROSIS OF THE LIVER.

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Gull Student in Pathology at Guy's Hospital.

The experiments which are the subject of this communication were not originally made for the purpose of investigating the production of necrosis of the liver by chloroform. They were but a means to quite a different end, but they seem of sufficient interest to record, fragmentary though they be, for they approach the subject from a somewhat different standpoint to that of previous observers; and, further, although a good deal of work has been done on the subject, it would not seem to have attracted any very general attention.

It is well known that chloroform, if given to an animal in sufficient dose, may, and under certain conditions invariably does, produce a marked change in the liver. The change, originally described as a fatty degeneration, has been defined by later investigators as a necrosis of the cells at the centre of the lobules. Most of these previous experiments appear to have been concerned with somewhat big doses of chloroform; in the very carefully planned series of experiments of Whipple and Sperry,[1] most of the dogs used were anaesthetized for periods of one and a half to three and a half hours, usually twice and often three times on days in quick succession. Although these observers concluded that necrosis of the liver invariably resulted in dogs after an hour or more narcosis with chloroform, none of the experiments actually recorded deal with a single anaesthesia of less than two and three-quarter hours' duration.

It was my aim to see whether equally constant changes, in less degree perhaps, could be produced by smaller doses, and, if so, what proportion of cases recovered when any marked change has been produced. Whipple and Sperry report that when recovery does take place repair of the liver is complete, even after a most extensive necrosis, in three weeks, and leaves behind no trace of the necrosis.

In my experiments rabbits and rats were used, but the use of rats was discontinued owing to the frequent occurrence of focal necrosis in the liver of rats from apparently independent causes.

The experiments here recorded deal only with rabbits. Chloroform was given by inhalation and by subcutaneous and intraperitoneal injection. The inhalation experiments will be dealt with first.

The 10 animals used were anaesthetized first with ether until they were well under, and chloroform was then substituted. Only a very light degree of anaesthesia was maintained, the corneal reflex being present practically throughout the experiments. The administration was continued from periods varying from thirty minutes to two hours, and two of the animals were anaesthetized twice on successive days. Great differences were noted in the way the animals took the anaesthetic. Nearly all took it badly, and in three cases, in spite of the presence of a brisk corneal reflex, the animal suddenly stopped breathing, and artificial breathing was necessitated. The results are tabulated in Table I.

One animal died during anaesthesia after forty-five minutes' narcosis. No change could be found in the liver attributable to the chloroform. Some fine globules of fat

* The expenses of this research were in part defrayed by a grant from the British Medical Association.

were seen scattered about in sections stained with Sudan III, but not more than is commonly to be seen in an apparently normal animal. In one other animal no change could be found. This rabbit had been anaesthetized for two periods of twenty minutes each on the same afternoon with an interval of an hour between them. It was killed forty-eight hours later, and the liver appeared normal.

In all the remaining eight animals there was a marked change in the central area of the liver lobules, varying from a fatty degeneration to a definite necrosis. The most extensive change was found in Rabbit 1, which had been anaesthetized for seventy-five minutes; but the appearances here and in Rabbit 4, which had received two anaesthesias of sixty minutes and forty-two minutes on successive days, were almost identical, and may be described together. The centre of the lobules is composed of cells of hyaline appearance, staining a light pink with eosin; the cell wall is usually intact, but the nucleus stains poorly, and is frequently fragmented. Here and there are collections of débris, obviously the remains of disintegrated cells. External to these necrotic cells is a ring of empty-looking cells, consisting of a cell wall and a central and often irregular nucleus surrounded by a clear space, or a very little granular protoplasm. Around the periphery of the lobule are two or three layers of healthy-looking cells. Droplets of fat are scattered throughout the lobule, but they are much more densely packed in the ring of cells lying immediately internal to the healthy peripheral cells. The capillaries at the centre of the lobule are dilated, but there are few leucocytes.

In Rabbit V. 3, anaesthetized for seventy minutes, the necrosis is limited to a narrow rim of cells surrounding the central vein, but the cells external to this rim, forming more than the inner half of the lobule, are loaded with droplets of fat

In Rabbit V. 1, anaesthetized for forty minutes, there was no necrosis, but the cells of the inner half of the lobule were densely packed with fat, the remaining cells at the periphery being practically free.

In Rabbit V. 2 the fatty change was much less marked, although strikingly similar in distribution.

In 77 per cent. of these animals which survived the period of narcosis there was therefore a marked change affecting principally the cells at the centre of the lobule. A rough glance at the accompanying table (Table I)

TABLE I.—*Inhalation Experiments.*

No. of Rabbit.	Length of Narcosis.	Time of Death.	Condition of Liver.
1	75 min.	Killed in 48 hours	+
4	60 ,, / 42 ,,	Died in 54 hours	+
2	60 ,,	Killed in 48 hours	+
V. 3	70 ,,	,, 48 ,,	+
3	2 hours	,, 72 ,,	+
5	12 min. / 30 ,,	,, 48 ,,	+
V. 1	40 ,,	,, 48 ,,	− Much fatty change
V. 2	35 ,,	,, 48 ,,	− ,, ,,
V. 4	Died during anaesthesia	—	− No fatty change
V. 5	20 min. / 20 ,,	Killed in 48 hours	− ,, ,,

+ = Definite necrosis at centre of the lobules.
− = No necrosis at centre of the lobules.
The animals are arranged in order according to the degree of change found in the liver.

might suggest that the effect on the liver varies directly with the dose; this is, however, not borne out on closer examination; for example, Rabbit 3, which underwent the longest period of anaesthesia, appears half-way down the list, and moreover in the case of Rabbits 1 and 4, which head the list, the mixture of air and chloroform circulating through the facepiece of the apparatus used contained a much lower percentage of chloroform than was the case of Rabbits 2 or V. 3.

This apparent lack of correspondence between dosage and the effect on the liver confirms the impression formed from observation during the anaesthesia, namely, that the toxic effects of the drug in no way run parallel to the anaesthetic effect, and I quite agree with those observers who say that the degree of anaesthesia is no measure of the degree of poisoning; twitching of the limbs, rotatory movements of the jaw, and very rapid breathing may all occur as signs of a deep degree of poisoning in only a very light stage of anaesthesia.

Injection Experiments (Table II).

Eight animals received 0.5 c.cm. of chloroform subcutaneously; of these six died within three days, and all six showed an extreme condition of necrosis at the centre of the lobules. It may be questionable as to when it is permissible to say, from the histological appearances, that a particular cell is dead and beyond recovery—that is, that necrosis has taken place; but in these animals there can, I think, be no doubt whatever. The centre of the lobules (in many cases as much as three-quarters of the entire lobule, or even more) is represented by a mass of red blood cells, with the remains of isolated liver cells scattered about amongst them. Some of these liver cells are intact, with nucleus and surrounding protoplasm, the latter hyaline and staining light pink with eosin, the former mostly fragmented; others consist merely of free nuclei with perhaps a little granular protoplasm left attached at one side, or again a mere granular mass of débris.

The amount of fat present varies considerably. In the cases where the necrosis is most extensive it is present in greatest quantity in the cells still left intact at the periphery of the lobule; in less advanced cases it is massed in large droplets in the cells lying between the necrotic area and the healthy peripheral cells. There is also a certain amount scattered about in globules in the necrotic areas, but to a very much less degree. Further, the fat is most abundant in those animals which have withstood the poison longest. In the animals dying within twenty-four hours it is relatively small in amount; in those which died on the second day it is present in definitely larger quantities, and it reaches its maximum in an animal which lived till the third day. Previous investigators seem to have concluded that the process was a primary fatty degeneration, passing on sometimes to a complete necrosis; but these observations lend some support to the view that I have formed from a consideration of the whole series that, when the poison is sufficiently intense, the necrosis is the primary change, and that a fatty degeneration is only observed in lesser degrees of poisoning, or where the poison is more dilute.

Of the two remaining animals one was killed on the sixth day, and one on the sixteenth day. The liver of the former showed definite necrosis around the central vein, but it was small in extent, the other seven-eighths of the lobule being composed of quite healthy cells. At the junction of the healthy and necrotic area large numbers of giant cells can be seen in all the sections; these frequently contain bile, and the nuclei are irregular and badly staining; they appear to be a stage in degeneration rather than in repair.

The liver of the animal killed on the sixteenth day is apparently normal; there is no increased amount of fat, and no evidence of a previous necrosis.

Thus, of the animals which received 0.5 c.cm. of chloroform subcutaneously 87.5 per cent. showed definite central necrosis of the liver.

TABLE II.—*Eight Animals Injected Subcutaneously with 0.5 c.cm. of Chloroform.*

Died within 20 hours	2 + +	Fat in intermediate zone.
Died within 24–48 hours	2 + +	More fat than in preceding.
Died within 2–3 days	2 + +	Fat in greatest quantity.
Killed on sixth day	1 +	
Killed on sixteenth day	1 −	

+ = Definite central necrosis.
− = No central necrosis.

Injection of 0.2 c.cm. of Chloroform.—The chloroform was injected either subcutaneously or intraperitoneally. I have not been able to trace any difference in the results

obtained from the two methods, and for convenience sake they are here grouped together (Table III).

The results of this series are much more complicated, and I shall only state them briefly. I cannot attempt to explain them at present. None of the animals of this series showed any anaesthetic effects from this dose. Within a few minutes of the injection they were usually found to be lying stretched out with the head retracted, and breathing shallowly and with great rapidity; this condition lasted not infrequently for several hours; but they responded to stimuli always, and if their position was altered, they would usually take a few jumps round the cage before returning to their original position.

Thirty-four animals received 0.2 c.cm. subcutaneously or intraperitoneally. Of those, 2 died on the fifth day, and both showed a central necrosis of the liver equal in extent to anything found in the previous series; the histological changes in these two were exactly similar to those already described and need not be repeated.

Five were killed within the first five days, and none of them showed any central necrosis, but extensive fatty degeneration was found at the centre of the lobules in 3 cases, less marked change in 1, and 1 was apparently normal.

Two were killed and 10 died within three weeks; in none of these was there any central necrosis or fatty degeneration at all similar to that previously described. I will speak of the condition found here later.

The remaining 15 animals were reinjected with the same dose twenty-six days later; of these, 1 died within twelve hours, 1 within ten days, and 2 within twenty-six days. None of them showed any central necrosis or fatty degeneration. The remaining 11 animals were again reinjected, the survivors receiving a fourth injection, and so on; only 1 animal survived a sixth injection, and this was killed. The results are seen in Table III.

TABLE III.—*Thirty-four Animals Injected Subcutaneously and Intraperitoneally with 0.2 c.cm. of Chloroform.*

No. of Injections given.	No. of Rabbits used.	Died within 12 Hours.	Died or Killed within 10 Days.	Died or Killed within 26 Days.
1	34	0	2 died + + 5 killed − *f* − *f* − *f* − *f* − 0	2 killed − − 10 died − − − − − − − − −
2	15	1−	1 died −	2 died − −
3	11	0	4 died − − − −	2 died − −
4	5	1−	0	0
5	4*	0	0	0
6	2	0	1 killed − 1 died −	0

\+ and − as before.
f = fatty degeneration at centre of lobule.
* Two of these animals were not used further.

In none of these reinjected animals was any change found in the liver at all comparable to that found in those dying or killed after a first injection. These animals do, however, show a definitely increased mortality; other animals not injected and kept under the same conditions lived on happily, while the chloroform rabbits died off. The livers of these animals, although in no way resembling those of the animals of the previous series, do all present a more or less similar picture, and one that must, I think, be abnormal. First, they are usually very full of blood; the central veins are dilated and packed with red blood cells; radiating from these are greatly distended capillaries also full of red cells, and compressing the adjacent columns of liver cells, so that in many cases the field presents a picture of broad columns of blood cells separated by a mere chain of nuclei of liver cells connected only by an attenuated cord of protoplasm. Secondly, the central vein is often lined by a thick wall of connective tissue frequently of a thickness of three liver cells, whilst in other cases the outline of the central vein has entirely disappeared, the vein being represented by an irregular space without a definite wall, filled with a grey granular material which often contains small colonies of isolated liver cells embedded in it. Here, too, the red blood cells form a very striking picture as they lie between the columns of liver cells, and often in close proximity to the central vein there are definite areas of haemorrhage.

Various observers, especially in France, speak of a second form of change in the liver produced by chloroform which they call "haemorrhagic," and which may, perhaps, resemble the conditions here described. For a satisfactory explanation of this condition I am completely at a loss; but it is possible that there has originally been some destruction of the cells at the centre of the lobule, and that in the process of regeneration of the liver cells the re-formation of the central vein has been incomplete or in some way interfered with.

The method of repair, and the extent to which it occurs, is too lengthy a subject to be discussed here, and must be left for a future occasion.

COMBINED SECTIONS OF PATHOLOGY AND BACTERIOLOGY.

THE Section of Pathology held a joint sitting with the Section of Bacteriology for the purpose of considering complement-fixation in diagnosis. It resulted in the reading of the following papers on different aspects of the subject:

I.—Professor A. WASSERMANN,
Berlin.

THE DIAGNOSTIC USE OF THE COMPLEMENT-FIXATION METHOD.

THE theme before us has become so very voluminous during the past few years through the zealous work of different authors that I cannot hope to treat it exhaustively within the limits of a short discourse. I shall, therefore, only pick out what is most important practically, and present even that as briefly as possible, since I regard my paper merely as an introduction to the discussion to follow.

In the first place, regarding the nature of the so-called fixation of the complement, it is known to you that it depends upon this principle: that when an antigen is mixed with its homologous immune body a union occurs between the two. If now complement—a constituent of every fresh serum—be at the same time added, it becomes anchored through the union of the antigen and antibody. It follows accordingly that if the complement be anchored, the conclusion may be drawn that either the homologous antigen or the homologous immune body is present in such a mixture. The determination whether in such an experiment the complement is bound can be made easily and convincingly.

For this purpose one needs simply to add simultaneously or somewhat later the serum of an animal, which has been previously treated with red blood corpuscles, the so-called amboceptor, together with its homologous erythrocytes. If the complement has already become bound as a result of the union between the anti and immune bodies, then it is no longer available for the haemolytic amboceptor and the red blood corpuscles. Consequently the latter remain undissolved. But if, on the contrary, fixation of the complement has not occurred, the complement goes over to the second group, and causes haemolysis of the blood corpuscles. Thus from the appearance or non-appearance of haemolysis, one can draw the conclusion as to whether the sought-for antigen or immune body is present in the first group. This experimental method has been known for only about ten years, and was first announced by Bordet and Gengou in connexion with theoretical and scientific work. These authors, however, had already recognized the diagnostic value of their method, for they employed as antigen emulsions of various kinds of bacteria with which they mixed human and animal serums, in order to determine whether fixation of the complement occurred—that is,

whether antisubstances corresponding to the different bacteria were present in the serums. Such investigations Widal and Le Soure made with typhoid, Bordet and Gengou with bovine and avian tuberculosis.

Nevertheless, the method as such could not establish itself in practical medicine, and for the reason that, as reported by Bordet, it offered no advantages over the diagnostic methods already in use. As already mentioned, Bordet used bacterial emulsions as antigen. Consequently the method in this form could only be employed in those infectious diseases whose agents could be grown in pure cultures. A modification, however, was made in this respect, for, together with my assistant Bruck, I was able to demonstrate that a bacterial emulsion is not at all necessary as antigen, but, on the contrary, it is even more advantageous to use as antigen the dissolved substances of bacteria which I obtained by the extraction of the bacilli bodies. One is much helped in the understanding of this through the excellent works of your late lamented countryman, Macfadyen, who demonstrated that the products of bacterial solution are often, biologically considered, even more active than the bacteria themselves. What, however, marks the greatest advance is this, that from that time on one might also use this fixation of the complement method in those diseases whose agents are still unknown or unable to be cultivated. To this end, in place of the bacterial cultures, one only needed to make extracts of the pathological organs of the disease in question, and to use them as antigen. After the preliminary investigations which I made on the extracts of meningococci and on tuberculin, namely, the extract of tubercle bacilli, had demonstrated both the possibility and the reliability of the method, I chose to use it as a new diagnostic measure in that most important field—syphilis, as you know.

The method of research was this: As antigen I used, together with Bruck and A. Neisser, the extract of the liver of a fetus with hereditary syphilis; to this we added the serum of normal and syphilis-infected apes and man, and then, by means of the above-described method, tested whether the complement had been fixed. We were able to demonstrate through these experiments that fixation of the complement occurred only when the serum of syphilitic individuals was added; but, on the contrary, remained absent if the material was obtained from healthy apes or healthy human beings. Thus it was shown, in principle, that a serum diagnosis of syphilis is possible. Further developments were then made in my laboratory, under my direction, by Porges and G. Meier, who demonstrated that the active principle contained in this extract is soluble, not only in water, but in alcohol as well, so that it must be closely related to the fatty-like substances—the so-called lipoids. Indeed, we were already at that time able to demonstrate that an alcoholic extract of normal non-syphilitic organs might likewise furnish an antigen which, in the majority of cases, would give a reaction with syphilitic serums. From which it follows that substances must be present in the syphilitic serums which have an especial affinity for the above-mentioned alcohol-soluble fatty substances. Since the establishment of this fact, most authors have turned away from the original extract made from syphilitic organs, using instead extracts of normal organs or ready-prepared lipoid with lecithin as antigen, on account of the greater ease with which these latter substances can be obtained. These authors hold that nothing more is present in the extract from syphilitic organs than is present in the extract of normal organs, since in the majority of cases of acquired lues the serums usually give corresponding results with both extracts. This is, however, erroneous. It would lead me too far here to go into the reasons why a syphilitic serum gives a reaction not only with the extract from syphilitic organs, but from normal organs as well.

I refer those of you who are interested in this matter to an article of mine which appeared recently in the *Berliner klinische Wochenschrift*. For to day, it should be enough to state that whoever works with an extract derived from syphilitic organs determines those substances in the blood serums which have been developed against the cause of the disease—namely, the spirochaetes. On the other hand, that whoever works with an extract derived from normal organs lacks those substances which have arisen through cell degeneration following spirochaetic activity. Now it is evident, without further discussion, that similar cell degenerations can likewise occur in other diseases; or, on the contrary, through only slight extension of the syphilitic process—as, for example, a gumma of the brain—a cell degeneration worthy of mention does not take place. It follows, therefore, unconditionally, that the extract of syphilitic organs must be the more specific and reliable antigen. Special evidence in this connexion has been furnished through certain experiments made by your countryman, Dean—who is at present working in the Lister Institute here—experiments concerning the relationship of idiocy to congenital syphilis, which he carried out in my laboratory. Dean was able to show that the serum of such patients practically never gave the reaction with an alcoholic extract from normal organs, while, on the contrary, it reacted typically with the aqueous extract of syphilitic organs. It follows, therefore, that in scientific and responsible researches one should always work with the original antigen obtained from syphilitic organs.

Before I pass to the application of serum diagnosis to syphilis, I should like to say a few more words about the further modifications of the original technique. It is surely an old story to you that in the past few years many proposals have been made to alter the original serodiagnostic method of syphilis. One author has proposed the use of a different complement from the one I recommended, another author a different haemolytic system—that is to say, a different kind of blood corpuscle than the sheep blood corpuscle, with its homologous rabbit immune body which I employ. All these modifications aim as their end-result to make the method more sensitive. We purposely chose a method that should not be too sensitive—that is to say, there must already be a considerable amount of reaction substances in the serum of the syphilitic, in order to avoid having a non-syphilitic give the reaction, and thus be regarded as a syphilitic. On the other hand, it is freely admitted that among 100 syphilitics certain ones having only a slight amount of antibodies will be passed over by the reaction. We regard this, however, as the lesser evil, since such individuals can be re-examined after a time, and particularly since physicians are not accustomed to exclude the diagnosis because of a negative diagnostic reaction.

Now, most of the authors who proposed this and that modification of the original method, sought to make the system so sensitive that it should show a still higher percentage of positive reactions than the original method. With this aim one author proposed the use of non heated serum, another, as Noguchi for example, the use of human blood corpuscles instead of the sheep blood corpuscles. According to my test of them, none of these modifications are to be recommended for practice. This applies very particularly to Noguchi's procedure, as Sleeswyk, working in my laboratory, has just recently demonstrated through careful tests. It suffers just like the other methods from the fault that it is too delicate, that is, it gives reactions with the serum of patients having other diseases while the original method shows no reaction in these cases. I cannot, therefore, recommend the use of these procedures or modifications for practice. In compliance with numerous requests in the literature and from practising physicians, I have seen to it that the reliable reagents, which according to my point of view are needed, should be dispensed from a central office, namely, the Pharmacological Institute of Ludwig Wilhelm Gans in Frankfurt-a-Maine.

Concerning the diagnostic significance of the syphilis reaction, this has been so repeatedly settled in every country that I do not need to speak much about it. In many countries, as in Austria and Denmark, serodiagnostic institutes have already been established by the Governments. I myself with my co-workers have carried out more than 10,000 examinations, and we have never yet made a false diagnosis. To be sure, to accomplish this one must completely master the technical details of the reaction, must have faultlessly accurate reagent titrations, and must adhere exactly to the rules which I and my co-workers have established. I wish particularly to warn you against the use of active human serum—that is, without having heated it at 55° for half an hour. A non-heated serum gives false results very easily. Furthermore, in establishing the diagnosis of syphilis for the first time it is essential that one should do this only when all the red blood corpuscles, or at least the vast majority, remain undissolved. So-called partial arrests of

haemolysis should not be taken into consideration in establishing the diagnosis. In such cases one should regard the reaction as doubtful, and should have the serum given to him again after some time. On this occasion I should also like to state that 4 to 5 c.cm. of blood should be withdrawn from the patient in order to have about 2 c cm. of serum for use. The serum should be heated at 55° immediately after clotting, and then be used for examination.

Concerning the specificity of the reaction, when carried out under such precautionary measures, it is strongly specific in the sense and within the limitations that apply to all immunity reactions. So it becomes at once clear that the serum of patients infected by an agent very closely related to the infectious agent of syphilis, the spirochaete, will give a like reaction, the so-called group reaction. We see just the same phenomenon in the Widal reaction of typhoid as in other such biological reactions. So it should cause no surprise that the serum of framboesic patients and recurrent fever patients should give a like reaction. Considering the close relationship between spirochaetes and trypanosomes, as well as other protozoa, which was emphasized by Schaudinn, the discoverer of the syphilitic spirochaete, organisms which have all in common the characteristic of liberating lipoid from the body cells, it should likewise cause no surprise that protozoa diseases in certain stages should show a similar reaction. The most important in this respect, and especially for you as the physicians of the greatest colonial empire of the world, is malaria. To study this question, I have sent my co-worker, Dr. Meier, to Italy, to investigate it during the summer, when malaria predominates there. Indeed, Dr. Meier, in association with Dr. Bonfiglio, has already demonstrated that malarial patients give the reaction as long as they have malarial parasites in the blood—therefore during and a short time after the paroxysm. It follows that one should employ the reaction with people who have been in the tropics and contracted malaria there only when one is convinced by their history that they have had no malarial attack during the last quarter of a year. Upon the whole I am of this opinion, and so I advise you accordingly, that whenever you wish to employ the serum reaction, to first determine by the patient's history that he has gone through no acute febrile infectious disease up to at least a month previously. Tuberous leprosy also gives a reaction like syphilis, but can be differentiated by the serological expert. Since, however, tuberous leprosy is very easily differentiated from lues, clinically and bacteriologically, and is not to be confused with it, it plays no practical rôle. If one holds to these preliminary precautions regarding technique and the anamnesis, then in case of a positive reaction, it can be said with certainty that the investigated case is syphilitic. On the other hand, if the reaction be negative, syphilis cannot be excluded absolutely, but only with a probability of about 90 per cent. Practically such a diagnostic measure is of the highest importance, since through it we can determine in the vast majority of cases whether a disease process is of syphilitic nature, and so can take proper measures to bring about its recovery. Of quite special importance, moreover, is the fact that we are now in the position, thanks to serum diagnosis, to determine in the latent state—that is, when manifest symptoms are no longer present—whether the individual in question is really no longer under the influence of syphilis, and therefore needs no further treatment. This investigation appears the more necessary since serum diagnosis has taught us that 100 per cent. of the cases of general paresis and aortic aneurysm, as well as about 90 per cent. of the cases of aortic insufficiency, give a positive lues reaction. We must, therefore, regard it as certain that these severe products of syphilis are recruited from those latent syphilitics who have not lost their reaction. In this connexion it is also important to call attention to the fact that not only the serum of paralytics, but their lumbar fluid as well, gives the syphilis reaction. One may therefore conclude immediately from a lumbar fluid showing the syphilis reaction that a syphilitic degenerative process of the central nervous system is present, either general paralysis or tabes.

Regarding the influence of treatment upon the reaction, exhaustive investigations have been made in Germany, particularly by Citron and in Neisser's clinic in Breslau, also in Copenhagen in the Government serum institute there by Boas and Thomsen. These investigations have shown that in the majority of recent cases we can cause the disappearance of the reaction through quicksilver treatment. If the treatment be then omitted for a while, after a longer or shorter time the reaction reappears, but can be made to disappear again through renewed treatment. But if the treatment be discontinued altogether, then the symptoms of the disease reappear soon after the reappearance of the reaction. The reaction is, therefore, the forerunner of the relapse. If, however, the reaction is already very old—that is, if the infection has already extended over years (and I have found reactions even fifty-four years after the primary infection)—then, according to my experience, it has become so stable that quicksilver treatment can no longer cause its disappearance. In general we can say that under the present-day therapy of syphilis by quicksilver and iodides, of those patients who have been treated only once or twice, about 50 per cent. retain the reaction after the disappearance of all outward symptoms—that is, in the latent stage of the disease. Of those patients who have been very vigorously—that is, again and again—treated, only about 20 per cent., yet still always a fifth remains uncured.

Viewed from this standpoint, Ehrlich's discovery of a new arsenic preparation which kills the spirochaetes far more actively than quicksilver, marks a tremendous advance. As far as we can judge at present, this new remedy appears to cause in a higher percentage the disappearance of the reaction, but whether persistently time is yet too short to tell. However this may be, from now on we must judge the virtues and superiority of each new syphilis measure by means of the reaction. If it succeeds in causing the persistent disappearance of the reaction, even in the latent stage, then we can be sure that the dreaded sequels of syphilis—general paralysis, tabes, and aortic disease—will be averted. You see, therefore, that the scope of serum diagnosis in syphilis, diagnostically, therapeutically, and especially prophylactically, with regard to hereditary transmission, is uncommonly great. We are surely only at the beginning of this matter, but within a few years, doubtlessly, every properly conducted and scientific treatment of syphilis will be carried out under the constant control of the syphilis sero-diagnosis.

It was only to be expected that the serum diagnosis method which I have set forth here somewhat at length could be applied not only to syphilis, but, by analogy, to other diseases as well. Indeed, it was very soon shown, after I had pointed this out, that latent glanders—which the extensive work of Schütz in particular has demonstrated—could likewise be diagnosed by the fixation of the complement method. And it is this method which today is used in Germany to a large extent to free the horse stables from horses with latent glanders.

Furthermore, it could be shown—I mention in this connexion the work of Ghedini and Weinberg—that by exact analogy with the serum diagnosis of syphilis, a serum diagnosis of infections with certain parasites—that is, *echinococcus*, *ankylostomum*, *Distoma hepaticum*—could easily be made if, as antigen, a watery or alcoholic extract was made of the parasites or of their capsules. As soon as the organism is freed from the parasites through operation—that is, the echinococci—or through other therapeutic measures, the reaction also disappears.

It was very important to be able to demonstrate, as was done by means of the complement fixation method, the presence of antibodies in the serum of individuals previously treated with tuberculin preparations. It is possible, therefore, at any time during the treatment, to have a picture of the immunization process—a procedure which especially Schlossmann in Düsseldorf, and Robert Koch during the latter years of his life, thoroughly elaborated. On the other hand, the investigations of Marmorek, though they demonstrated, by means of the fixation of the complement method, specific substances in the urine of tuberculous patients, have nevertheless not stood the test for diagnostic purposes, since the presence of these substances in the urine is too infrequent and irregular. Finally, it may be added that the fixation of the complement method, by virtue of its specificity, may naturally also be used to differentiate different kinds of bacteria and albumens. The latter procedure particularly, contributed by Neisser and Sachs, is of practical importance in legal medicine, for through it the smallest traces

of blood can be settled as to their origin, whether human or animal.

Thus we see what a great new field this method of complement fixation has opened up to us, and how animal research and experimental laboratory work have again succeeded in giving important facts for diagnosis and therapy to practical medicine and to the clinic.

II.—H. WANSEY BAYLY, M.A.Camb., M.R.C.S., L.R.C.P.,
Bacteriological Department, St. George's Hospital.

THE PRACTICAL VALUE OF THE WASSERMANN REACTION.

I VENTURE to lay before you the result of eighteen months' use of the Wassermann reaction in the London Lock hospitals. I have completed over 1,000 determinations, and as the months pass on I am only more and more impressed with the value of the test. I have used an alcoholic extract of rabbit's heart for syphilitic antigen, and have found that I have obtained as good results as with an alcoholic extract of fetal syphilitic liver.

Many observers have tried to simplify the test and obviate the necessity for using rabbits and guinea-pigs by making use of the complement and haemolysin for sheep's corpuscles present in human blood serum. It seems to me, however, that the most essential of all factors in a comparative test such as this is that all factors except the one to be tested should be constant. With Hecht's, Bauer's, Stern's, or Fleming's technique, however, variants are substituted for constants, which in my opinion does not increase the reliability of the test; for the complement content of human serum varies greatly, and some human serums contain no haemolytic antibody to sheep's corpuscles, while others contain some, but in varying quantities. In the technique that I use and advocate I mix fresh guinea-pig serum (for complement) and alcoholic extract of rabbit heart (for the body acting as syphilitic antigen) and normal saline solution *in bulk* and put 2·5 c.cm. of this mixture into each test tube. The only variant that I use is the decomplementized serum to be tested, of which I add 0·3 c.cm. per tube.

In the same way I mix in bulk the prepared rabbit's decomplementized haemolytic serum and the suspension of washed sheep's corpuscles. Any difference in the amount of haemolysis between the tubes must therefore be due to the only variant factor—namely, the serum tested, for syphilitic antigen complement and haemolytic system are all constants. This is not the case, however, with the so-called simplified methods, where the complement and haemolytic antibody are variants, and the cause of any difference in haemolysis must therefore be unknown.

Benefiting by the advice and experience of Captain Harrison (who published a very interesting article on the Serum Diagnosis of Syphilis in the July number of the *Journal of the Royal Army Medical Corps*), I have for the last six months used two strengths of complement, and so obtained a roughly quantitative measurement of the complement deviating power of the serum. Frequently in this way we can obtain an indication that the patient is getting under the influence of treatment, and some haemolysis will occur in the tube containing the larger dose of complement, although the smaller dose of complement is completely deviated.*

By this means I have investigated the therapeutic value of some of the different antisyphilitic remedies, and the comparative value of the different methods of administering mercury, and in conjunction with Mr. Charles Gibbs I published in the *Lancet* of May 7th last a short preliminary note on this subject.

The results that I have so far obtained point to the conclusion that less than six months' pill treatment has little or no effect on the Wassermann reaction, no trace of haemolysis occurring even in the tubes containing the double dose of complement. On the other hand, a large majority of cases treated by inunction and a very considerable percentage of cases treated with intramuscular injection of insoluble mercurial preparations show some definite effect of treatment after one three months' course.

* This quantitative measurement of the complement deviating power of the serum can obviously not be determined by the so-called simplified methods.

Potassium iodide and the arylarsonates seem to have no effect on the Wassermann reaction as far as three months' treatment is concerned.

We therefcre conclude that inunction and intramuscular injections are the best methods of administering mercury and in the order named.

I have found that about 85 per cent. of all untreated syphilitics give a positive reaction. In no case of tubercle or cancer and in no healthy individual have I obtained a positive reaction. The highest percentage of positive results has been obtained with untreated congenital syphilitics, practically every case giving the reaction. In primary cases in which the lesion has been present for less than a fortnight the majority of cases give a negative reaction, but after the lesion has been present for a month a positive reaction is recorded in 75 per cent. of cases.

Secondary syphilis with symptoms gives a positive reaction in over 90 per cent. of cases and tertiary syphilis in about 75 per cent. of cases. Of parasyphilitic conditions general paralysis gives a positive result in over 90 per cent., but tabes in only about 50 per cent. of cases.

The history of the Wassermann reaction is too recent for us yet to have acquired sufficient data in regard to its value as a guide to permanent and complete cure. Even in a case where a succession of negative results has been obtained after all treatment has been left off, we cannot be certain until another twenty years have passed that the disease is entirely and absolutely obliterated and that no late manifestation will ever occur. By its means we have indeed learnt that many cases considered cured were not cured, and it is the general opinion that three negative reactions taken at three or six months intervals, during which no mercury is given, can be considered as an absolute cure.

We can only say that an opinion based on this evidence is of far greater value than an opinion based only on clinical or rule of thumb grounds, but we cannot yet be certain that such an opinion would invariably be correct.

In the state of our present knowledge, however, I do not think that it would be justifiable to recommend less than three years' treatment, even if a succession of negative reactions have been obtained, for it has been shown that if treatment is left off a positive reaction may occur. Too much reliance, therefore, should not be placed on a solitary negative reaction for the exclusion of syphilitic infection.

We at the Lock hospitals are entirely satisfied as to the great value of the Wassermann reaction from the diagnostic point of view; such clinically doubtful cases that gave a positive reaction always showing later either by their reaction to mercurial treatment or by the development of clinical symptoms that they were syphilitic. In so far as we have gone at present in regard to treatment also the pathological evidence as estimated by the Wassermann reaction and the clinical evidence seem in the great majority of cases to go hand in hand. I consider that more reliable results are obtained with blood serum than with cerebro-spinal fluid. I have also failed to obtain satisfactory results when urine has been substituted for serum.

As regards the complement deviation test for tuberculous infection as used by Dr. Marmorek, of Paris, my results have been disappointing, and have not agreed with the results published in Paris. But with the Wassermann reaction it will be seen that my results are entirely in accord with those obtained by Professor Wassermann.

III.—ROBERT MUIR, M.D.Edin.,
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THE FIXATION OF COMPLEMENT IN GENERAL.

As a contribution to this discussion, I propose to offer some observations with regard to the properties of complement in general, especially in relation to the question of fixation. Complement is notoriously susceptible to physical agencies, heat, light, and even mechanical shaking, and to the action of chemical substances; it is no less strikingly liable to absorption by various substances in solution or in suspension, and it is accordingly desirable to consider some of the chief conditions under which this takes place. It may, however, be well in the first place to point out that in the various tests we rarely inquire into the presence or absence of complement in an active form.

Now, when complement or its activity disappears from a fluid in which it was formerly present, this may be due to one of at least three conditions: (*a*) Destruction of complement by a physical or chemical process; (*b*) inhibition of complement—for example, by a concentrated salt solution, the activity being restored on diluting, and it is important to bear in mind that many proteins in solution have an inhibitory action; and (*c*) the actual binding or fixation of complement, of which the most striking is that by the combination of antigen + antisubstance. It is with regard to the last mentioned—the fixation of complement—that we are chiefly concerned at present, but it is to be noted that it is not possible at present to draw a hard-and-fast line between the three sets of conditions mentioned. The evidence of the occurrence of inhibition, for example, is the restoration of the properties of complement on the removal of the inhibitory substance or condition; but we do not know the real nature of inhibition, and we may accordingly fail to detect inhibition, and appear to have fixation of complement before us, simply because we have not the means of removing the inhibitory substance.

However, taking the facts already known, we may say that fixation of complement occurs under the following conditions:

(*a*) In the presence of an antigen + its antisubstance, and, of course, the antigen may be of various kinds—for example, bacteria, red corpuscles, tissue cells, various proteins, etc.; (*b*) in the syphilitic reaction of Wassermann; (*c*) in the presence of various organic substances in solution or as colloidal suspensions, or in mixtures of these; (*d*) in the presence of comparatively gross particles suspended in a fluid, especially organic particles—for example, bacteria, yeasts, tissue cells, etc., though also inorganic particles have to a certain extent this property. The removal of complement by filtration through a porcelain filter is probably closely allied to this process of surface absorption. This arrangement is merely made for convenience. For example, the Wassermann reaction is not to be considered as really standing by itself, but we place it so because we do not understand its true nature; and further, all intermediate stages between (*c*) and (*d*) might be given. In all the conditions mentioned the combination of complement is a firm one, and although there are facts which suggest that a small amount may be dissociated again, this can hardly be said to be satisfactorily demonstrated. And there is also the common feature that, just as in the case of toxin in its union with antitoxin, when a small amount of complement is left free in any of these conditions, much more than one dose of complement must be added before one free dose is obtained. Further, in all four divisions the physical condition of the fixing agents play an important part. We may now consider in greater detail these conditions of fixation.

(*a*) *Fixation by Antigen + Antisubstance.*—Regarding complement as a substance we know practically nothing; we can, in fact, only recognize it by its action in producing haemolytic, bacteriolytic, or some other effect. The fact that in such actions—for example, haemolysis—the dose of complement necessary to produce the given effect is a definite one, pointed to its being fixed, or at least used up; but it is the deviation method of Bordet and Gengou that has supplied us with the most useful and most widely applicable method of studying the behaviour of complement in various reactions. This is, of course, an indirect or subtraction method. The lysis of corpuscles treated with immune body, or sensitized, is the direct evidence of the presence and activity of complement; the interference with lysis after complement has been allowed to interact with an antigen + its antisubstance is the indirect evidence that complement has been fixed. In the present condition of our knowledge it seems to me advisable to keep cases of this kind by themselves, that is, apart from the examples of non-specific fixation of complement. It is quite evident that the method can be applied both for the detection of antigen (given antisubstance) or of antisubstance (given antigen), and in my opinion the method is a valid one, and is so within as wide limits as the methods used in the detection of other antisubstances, for example, opsonins, agglutinins.

It may be that non-specific or co-lateral immune bodies can be developed in some instances, as seems to be the case with agglutinins (Nebenagglutinins), but this is another matter. It is not only as widely applicable as but of corresponding delicacy to, the other methods, provided that it be properly carried in a quantitative manner. In testing, for example, whether a specific antisubstance is present in the serum, the best method, in my opinion, is to use a fixed quantity of antigen and antisubstance along with varying amounts of complement in a series of tubes, the smallest amount being less than a haemolytic dose. By such a method, when suitable controls are used, the absorption or fixation of a very minute quantity of complement can be readily observed. The only provision that has to be made is that we must be certain that in the case of the antisubstance in question zone phenomena do not occur; that is inhibition of the deviation of complement when one of the two substances is present in excess. An example of such an occurrence is seen in the case of a precipitating antiserum produced by the injection of the serum of one animal into another of different species. In this case an excess of antigen leads to a diminution or even disappearance of the deviation of complement, a phenomenon which is closely allied to the inhibition of precipitation and to the solution of precipitate after it is formed. This subject will be referred to below. I have had an extensive experience of the deviation of complement method in the case of all three of the chief types of antiserums—namely, antibacterial, haemolytic, and precipitating serums—and I can testify to its extreme usefulness for the purpose of detecting the substances in question and of studying variations in their amount under altered physical conditions.

By this method I was able to study the actual amount of complement taken up in relation to the amount of immune body, and was able to show that many times the haemolytic dose might actually be fixed. Again, Dr. Browning and I applied the method to the study of the combination of various complements, and showed how, apart from the combining properties, complements of different animals showed great variations in their toxic effects, as seen in haemolytic phenomena. We also showed how complements from different species of animals mutually excluded one another from combination with sensitized corpuscles—that is, possessed similar combining groups—and such observations have since been widely extended. In the case of a precipitating antiserum, Dr. Martin and I confirmed the results of others as to the deviation test being much more delicate, often ten times more so, than the ordinary precipitin test, and Dr. Haswell Wilson applying the method to albuminous urine, found that albumen could be demonstrated by it in from ten to a hundred times greater dilutions than was possible by any chemical method. The method can be appplied, with slight alteration, also to the study of the bactericidal properties of the serum. In this case the bacteria sensitive to bactericidal action are substituted for sensitized corpuscles. Accordingly, as a means of analysis of haemolytic and other phenomena, the deviation test is invaluable, and is, in fact, one of the most useful which we possess.

I need not enumerate the various bacterial diseases in which deviation of complement can be observed—that is, in which specific antisubstance can be detected by the deviation method. Their number is now so great as to include practically all known bacterial infections; in fact, we may state it as a general law that in such conditions there are formed antisubstances of the nature of immune bodies which in association with the antigen fix complement. It is to be noted that no rule can be laid down as to the relative proportion of the different kinds of antisubstances—immune bodies, agglutinins, precipitins, opsonins—in the various infections; in fact, they vary much in their proportionate amount in different cases. The question must accordingly be worked out in the case of each disease or condition of infection experimentally produced. On the whole, immune opsonins and agglutinins are present in relatively larger amount, or, rather, their presence can be demonstrated in much greater dilutions of the serum than is the case with immune bodies. For this reason, and also for the reason that the method when satisfactorily performed involves a more complicated technique, and takes longer to carry out than the others, I do not consider that the deviation method will come into extensive use as a means of clinical diagnosis; still there are cases—for example, where it is difficult or impossible to use the agglutination reaction—in which

the deviation method will be found to be very useful. The method is also of service in considering the etiological relationship of an organism; in this case we have the antisubstance in the serum of the patient, and we test whether the suspected organism will functionate as antigen. The most striking example of this application is the well-known work of Bordet and Gengou with regard to the bacillus of whooping-cough.

(*b*) *Fixation in the Wassermann Reaction*.—Although it was by the application of the principle of fixation of complement by antigen + antisubstance that Wassermann, Neisser, and Bruck discovered the serum reaction of syphilis, this phenomenon must now be considered to be of different nature. Extract of liver containing spirochaetes was found to be replaceable by extract of normal liver, and this again by solutions or emulsions of substances of comparatively simple and known constitution. The antigen is not the spirochaete, and it is no less certain that it cannot be any product resulting from the action of the latter, as if this were so, it would follow that only extracts of syphilitic tissues could functionate as antigen. It is a matter of regret, in my opinion, that Professor Wassermann in his introduction to this discussion has not drawn this distinction between deviation of complement in various bacterial infections and that in syphilis. In the former it is only the antigen *sensu stricto* that, along with the corresponding serum, leads to the fixation of complement; in the latter a number of substances, especially lipoids, can act in this way. It is not of great moment that an extract of syphilitic liver is usually more efficient than one of normal liver, and of this another explanation than that the former contains a true syphilitic antigen might be given. What really is of interest and importance is that oleates, glycocholates, lecithin, cholesterin, etc., and especially combinations of these, can be used to bring out the characteristic reaction with syphilitic serum. Of this fact, the importance of which has been overlooked by him, no real explanation can yet be given. It seems to me that we can only say at present that some substance, apparently a modified protein, is peculiar to or present in specially large amount in syphilitic serum, and that this, in combination or in association with lipoids, etc, leads to the fixation of large amounts of complement. With regard to the validity of the method, practically all are now agreed, and I would only wish to add that the discovery is, in my opinion, one of the most important in the history of medical science, and one of which the far-reaching influence cannot be yet fully appreciated.

I would like, however, in the first place to refer especially to the complexity of the reaction and the various influences which modify it. It is to be noted that the test is a quantitative one; it is not a question as to whether or not complement is fixed or not, but one as to how much is fixed. We are dealing in the reaction with three ingredients, and each of these is a mixture of complex organic substances. The result, that is the amount of complement fixed, is found to depend upon variations in each of the three ingredients, and we may accordingly consider some of these. It was shown by Sachs and Rondoni, and confirmed by Browning and McKenzie, that a turbid emulsion of the extract, which acts as antigen, leads, with the syphilitic serum, to the fixation of a larger amount of complement than a comparatively clear one; here manifestly a purely physical condition plays an important part. These latter observers also found that guinea-pig's complement is deviated in larger amount when used fresh than after it has been kept some time, though the haemolytic dose may have remained unaltered in the interval. They also showed that individual variations in the faculty of being fixed were met with amongst different samples of guinea-pig's complement—that is, taking the haemolytic dose as the estimate of the amount of complement, they showed that when several complements were tested different amounts were deviated by the same mixtures and under the same conditions of experiment. Then, lastly, with regard to the serum to be tested, a syphilitic serum in the fresh state usually deviates (along with the extract) more complement than when it is heated to 55° C. But the same appears to apply to non-syphilitic serums, and these latter may when unheated come to react positively according to some standards. Hence it is better to use the serum to be tested after heating at 55° C., as the difference between syphilitic and non-syphilitic is in this way more markedly brought out.

From these facts and others of similar nature there follow two conclusions, the one of theoretical, the other of practical importance. The first is that in the Wassermann reaction we have to do with a phenomenon of very complex nature, and one whose result may be modified by physical agencies in a way which is not yet understood, and the other is that thorough familiarity with the reaction and scrupulous care in carrying it out are essential for obtaining the best results.

I am not going into the question of the different methods of applying the test, as I understand that this will be dealt with by Dr. Dean, but I may say that in my own laboratory the reaction is always tested for by a quantitative method; the haemolytic dose of complement is estimated and increasing multiples of doses are added to tubes in series, so that in any case we see the actual number of doses which are fixed, controls being made with extract alone and with serum alone in each case. The method takes a little longer and requires more serum than the one-tube method, but it has the great advantage of showing exactly the degree of deviation in each case, and thus gives greater confidence to the observer. I consider that in any method where the deviation of a fixed quantity of complement is taken as the indication of a positive or negative result there ought to be at least one other tube containing one-half or two-thirds of that quantity. By such means suspicious cases may be detected by incomplete reactions, whereas by the strictly one-tube method this is impossible.

(*c*) We come now to consider the deviation of complement apart from the two first conditions—that is, where we have neither the presence of antigen+antisubstance, nor a syphilitic serum along with one of the various extracts used. We know, for example, that emulsions of extracts used in the Wassermann reaction have what we may call an anticomplement effect, as has also normal serum to a slight extent, and that mixtures of normal serum, especially when unheated, and of extract may have a greater effect than the sum of the effects of the components by themselves. Such an effect is often spoken of as non-specific, and the term is convenient, but we can hardly say definitely whether the syphilitic serum really contains some new substance, or whether there is merely an increase of a substance normally present. Also, with regard to these non specific deviations, we cannot say to what extent inhibition, as contrasted with fixations, plays a part. But it is interesting to note that in these cases also the physical condition of the substances concerned is of importance; for example, there is a marked difference according to the clearness or turbidity of the emulsion.

Another illustration may be quoted from a recently-published paper by Browning, Cruickshank, and McKenzie. Using an extract of ox's liver in cold ethyl acetate, they found that an emulsion of this in salt solution has a very powerful anticomplement effect, which is neutralized to a large extent by lecithin when this is added in solution to the extract and the emulsion is then made; on the other hand, when the emulsions are made separately and then mixed, the anticomplement effect remains practically unaltered.

It has been noted by various observers that when human complement—unheated serum—is kept in a sterile condition, its anticomplement action may gradually increase. Browning and McKenzie have found that after two or three months a quantity of such serum equal to that used in the Wassermann reaction may antagonize from fifteen to twenty doses of guinea-pig's complement, or in other words, such a serum without the addition of any extract would give a positive reaction. This is a remarkable result, and it is equally remarkable that when such a serum is heated for an hour at 55° C. this anticomplement effect disappears. These results, which have not yet been published, show that changes taking place spontaneously in a normal serum may result in its acquiring the power of neutralizing complement and that this property is a very labile one. From facts such as these it is seen on how comparatively slight changes in the serum the power of fixing or inhibiting the action of complement may depend.

(*d*) It is not necessary to consider in detail the fixation of complement by comparatively large organic particles,

apparently by surface deposition or adsorption. It may be mentioned, however, that such fixation corresponds in various respects with the cases already discussed—for example, it does not take place, or does so only to a slight degree, at 0° C.; that the saturation phenomena are similar, and that on heating the substances which have fixed complement at 55° C., a temperature sufficient to destroy the complement, the avidity for complement is not restored.

I have thus endeavoured to give a sketch of the conditions in which complement is fixed or disappears in an active form from a solution. We are not yet at a stage at which we may attempt to offer explanations; we are merely concerned with obtaining and arranging facts. We have seen, that gross organic particles fix complement by surface adsorption, that solutions or suspensions of proteins, lipoids, and especially mixtures of these, have a similar property, or at least the property of annulling the activity of complement; and of very great importance, it seems to me, is the fact that changes occurring spontaneously in sterile normal serum may lead to the development of inhibitory or deviating action. We have to note in all these cases the important part played by physical conditions, and, of course, we have nothing to do with special complementophile groups. In view of all the facts, the deviation in the Wassermann reaction cannot, in my opinion, be considered to depend on the presence of an antigen in the strict sense, but is to be regarded as an example of fixation of complement by a mixture of organic compounds. Farther than this we cannot go at present. The question may be asked, Is the fixation of complement by the combination of antigen+antisubstance to be regarded as a phenomenon standing by itself? or does the interaction of the two substances result in some physical change which leads to the absorption of complement? This involves the whole subject of the supposed amboceptor constitution of the immune body and the complementophile group, and cannot be discussed now. But the facts referred to above with regard to the relationship of precipitation and complement deviation, in the case of a precipitating antiserum, appear to me to form a link between this and the other forms of deviation. In any case I do not know of any facts which can be accepted as direct evidence of the direct union of complement and immune body and I consider that the use of the term "amboceptor" is not justified. The constitution and mode of action of immune body are certainly worthy of further study and consideration in view of the more recently established facts with regard to deviation phenomena.

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ON THE STRUCTURE OF COMPLEMENT IN RELATION TO DEVIATION.

The mechanism of complement deviation has already been so clearly explained by Professor Wassermann and Professor Muir in the course of this discussion that I need not again describe the process in any detail. Red blood corpuscles when treated or "sensitized" with the serum of an animal immunized to them acquire the power of attracting complement, a substance found in fresh normal serum. This is a property which the red corpuscles share with other cells similarly treated. Most cells, including bacteria, have the property of attracting complement, when they are combined with the serum of an animal immunized to them. On this fact is based the whole technique of complement deviation as a means of diagnosis.

Now this attraction of the sensitized red cells for complement may be accentuated or diminished according to circumstances which are within our control. It is a familiar fact that at a low temperature the sensitized red cells are usually unable to take up complement out of the the fluid in which they are suspended; they consequently remain unlaked. Similarly, if the complement is offered to the sensitized cells in a fluid which contains a high concentration of sodium chloride—that is, is hypertonic—their capacity of taking up the complement may be considerably reduced. There are other methods known, by which we can inhibit these sensitized cells from obtaining the complement offered to them; but the one to which I wish to direct your attention is that of altering the reaction of the medium in which the haemolytic constituents are mixed.

In a mixture of a definite slight degree of acidity haemolysis does not occur. The red cells are present sensitized, but they cannot avail themselves of the complement which is also present, and they remain unlaked. It was shown by Michaelis and Skwirsky that under such conditions the red cells, although not laked, may still be not unaffected by the complement with which they have been in contact. The corpuscles are suspended in an isotonic solution of acid sodium phosphate of known acidity, and mixed with complement and the appropriate immune serum. After an interval the mixture is centrifugalized, and the supernatant fluid is removed from the unlaked red cells, and both fluid and red cells neutralized. Even after suspension in a neutral fluid the red cells remain unlaked. They are fully sensitized, because the addition of fresh complement causes rapid laking. The failure of haemolysis, then, is evidently due to the fact that the sensitized cells have not taken up the complement when it was offered them.

We should expect, then, to find the complement left in the supernatant fluid, and available in the now neutralized fluid. If, however, we add this neutral fluid to other red cells, sensitized equally, but in the usual way, by the addition of immune serum without complement, no haemolysis occurs. We do not, in fact, find the complement in the supernatant fluid. What, then, has become of it? An explanation, which immediately offers itself, is that the complement has been destroyed by the acidity of the original mixture. This, however, is not the case. For, if one adds the neutralized fluid to the cells from which it was separated by means of the centrifuge while it was acid, haemolysis occurs as readily as if we added fresh untreated complement. The complement has not been destroyed.

We are then in this case. We have a fluid, the neutralized supernatant fluid, which is unable to lake cells sensitized in the ordinary way. This fluid, then, must lack an ingredient essential to haemolysis, namely, the complement or part of it. It can, however, lake the cells from which it was removed. These cells, then, must contain the missing ingredient. But we know that these cells do not contain the complete complement. Hence we may deduce that the cells contain one fraction of the complement, which I shall call C, and the supernatant fluid another fraction, C′. The argument may be summarized in this way:

1. Complement + ordinarily sensitized cells = laking.
   Supernatant fluid + ordinarily sensitized cells = no laking.
   Therefore the supernatant fluid does not contain the complete complement.
2. Treated sensitized cells by themselves = no laking.
   Therefore these cells do not contain the complete complement.
3. Supernatant fluid + treated sensitized cells = laking.
   Therefore this mixture contains the complete complement.

That is—The treated cells contain one fraction of the complement C, and the supernatant fluid another fraction of the complement C′.

A similar division of complement into two parts was effected some years ago by Ferrata by means of dialysis; but his method is very uncertain and gives very irregular results. One portion came down with the globulins which fell out of solution as dialysis progressed, and the other portion remained in solution. Ferrata believed that the globulin part, which corresponds to what we are calling C, is thermostable. But I find that not only is C′ destroyed by half an hour at 55° C., but also C. For, if you heat whole complement, you cannot by adding C′ restore its activity. It is interesting to note that a C derived from human serum by the acid method described acts at least as well with the C′ of guinea pig serum as does guinea-pig C itself. I am not yet certain whether the C′ of human serum acts with the C of the guinea-pig.

Now, in deviation experiments, as ordinarily carried out—that is, with extracts, whether of bacteria or of syphilitic liver, as in the Wassermann reaction—it is not the whole of the complement that is deviated. After completing a strongly positive Wassermann reaction or a deviation with bacterial extract, the corpuscles settle down in the tube unlaked, and the supernatant fluid remains clear and untinted with haemoglobin. Such a supernatant fluid is incapable of laking red cells highly sensitized in the ordinary way, but, if you add it to cells treated in the manner described with acid phosphate, laking occurs quickly. The supernatant fluid therefore

contains C′, and only part of the complement has been deviated—namely, C. In deviation experiments, then, what occurs is the removal of C, while C′ remains free and intact. I have tried this with various forms of deviation, such as the ordinary bacterial extract, the Wassermann reaction, and the precipitin reaction, and always with the same result: only C is deviated. Even in cases of spontaneous deviation, those non-specific deviations of complement which render rigid controls so necessary a part of a reliable Wassermann technique, it is not a deviation of the whole complement that occurs, but of only a part, and of always the same part—namely, C.

Whether if one used, instead of bacterial extracts according to the modification introduced by Wassermann, the whole bacteria as in the original method of Bordet and Gengou, one would still find only a part of the complement deviated, I cannot yet say. The attraction of red cells sensitized under ordinary conditions is for the whole complement, since they undergo lysis. It is reasonable to expect that in the case of bacterial cells the same will hold good. At least this expectation is reasonable for the bacteria, such as cholera or typhoid, which undergo lysis under the action of complement and immune serum. It will be of considerable interest, theoretical and practical, to determine whether organisms, such as many cocci, which do not undergo lysis, take up the whole complement or remain undissolved, because they are capable of taking up only a part, the portion corresponding to C.

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THE DIAGNOSIS OF SYPHILIS BY THE COMPLEMENTAL DEVIATION METHOD.

I.—*Diagnosis at an Early Stage.*

During the past eighteen months, at the R.N. Hospital, Haslar, I have, for diagnostic purposes, made systematic examinations of the serums of the majority of early venereal cases admitted there, and also of men suffering from other diseases under treatment during this period. In a large hospital situated in a naval port and garrison town the number of venereal cases admitted is naturally large, and I had the advantage of seeing them from both a clinical and laboratory point of view. It was therefore possible to make repeated examinations of any single case, as was frequently done when there was any doubt as to the diagnosis.

For much assistance in this work I have to thank Staff Surgeon Adams, R.N., who was in charge of the cases.

The men are generally sent to the hospital as soon as possible for treatment, so that valuable opportunities were given for determining how early after infection the presence of the immune body could be detected; this I have endeavoured to do. Examinations of serums were made weekly, the blood being taken at a fixed time, the tubes numbered and tested under exactly similar conditions throughout. Three methods have almost always been employed with all the serums: (1) Fleming's modification of Hecht's method; (2) The original method with heated serums, but using an alcoholic extract for the antigen; (3) similar methods, but with unheated "test" serums.

A total of 1,166 bloods have been examined, giving the results shown in Table I.

Table I.

	Cases.	Positive.	Negative.	Percentage.
Syphilis (1)...	183	139	44	75.9, positive
Syphilis (2), mostly early	407	384	23	94.1 ,,
Syphilis, late (2) and (3)	51	48	3	94 ,,
Congenital...	1	1	0	100 ,,
Latent	39	18	21	46 ,,
Parasyphilis, tabes, and G.P.I.	20	18	2	90.0 ,,
Chancroids	280	0	280	100.0, negative
Gonorrhoea	39	0	39	100.0 ,,
Other diseases	146	2	144	98.0 ,,

The two positive cases returned not due to syphilis were (1) acute scarlet fever; (2) malignant disease of the liver in a Maltese, with intense jaundice and bile-stained serum. The other diseases included almost every condition admitted into the hospital, malaria and tubercle being especially noted. Among the tertiary syphilitic cases are many with old syphilitic histories, but with present symptoms of arterial degenerations and aneurysms.

A great number of the men were admitted with a diagnosis of chancroid. Many of these gave persistent negative reactions, and turned out to be true local sores; others were undoubtedly cases of mixed infections, positive reactions being obtained and clinical signs developing later; some were definitely syphilis from the first.

It is important to have some definite understanding when a case should be entered as primary and when secondary syphilis; the method here employed was to place the case as one of secondary syphilis if any evidence of general infection, however slight, was manifest, particularly enlargement of the epitrochlear glands, so that in this return cases appear as early secondaries which might by others be entered as primary syphilis. A considerable number of men with primary syphilitic and mixed sores gave negative reactions for several weeks, but all ultimately reacted, either before or during the early secondary stage; in some spirochaetes were demonstrated before the positive reaction was given. Men with extra-genital sores generally reacted earlier than those who contracted the disease in the ordinary way.

In many cases the date of infection was impossible to ascertain, many opportunities of infection having occurred, but from others in whom definite data were obtained I have compiled Table II, which shows that the reaction commences to appear about the forty-fifth day *after infection*, is generally present between the fiftieth and sixtieth days, and becomes stronger as secondary symptoms develop.

Table II.—*Date of the Appearance of the Reaction in 12 well-authenticated Cases, where more than One Observation was taken, and Secondary Symptoms developed.*

Case.	Disease.	Negative Reaction.	Positive Reaction.	Treatment.
1	Chancre of face	28th day after infection	42nd day	1 injection.
2	Syphilis 1 ...	30th day	45th ,,	None.
3	Chancroid ...	42nd ,,	49th ,,	,,
4	Chancroid ...	28th, 35th, 42nd days	49th ,,	,,
5	Chancroid ...	13th, 27th days	55th ,,	,,
6	Syphilis 1 ...	49th day	56th ,,	,,
7	Chancroid ...	49th ,,	56th ,,	,,
8	Chancroid ...	36th, 42nd, 50th days	57th ,,	,,
9	Chancroid ...	27th day	57th ,,	,,
10	Syphilis 1 ...	36th ,,	60th ,,	,,
11	Chancroid ...	58th ,,	65th ,,	,,
12	Chancroid ...	65th, 72nd, 77th days	84th ,,	3 injections.

The cases of secondary syphilis that gave a negative reaction had almost all had much treatment, and as a rule showed little clinical evidence; in others, when the disease was "latent," negative reactions were most common and generally there was a history of a year's treatment or of a great number of injections. The intermittency of the reaction was frequently seen in cases which had been treated by intramuscular injections. For instance, in a case giving a well-marked positive reaction, after fourteen injections or so, the positive was replaced by a negative one; this continued for some weeks, then the positive reaction again appeared, to be again rendered negative by a third course of seven injections, this disappearance and reappearance making it important to be careful to give no definite opinion from a single examination. Very often men were tested who stated that they had received months of treatment, with twenty to seventy injections, these still giving positive reactions; there is little doubt that in most of these the injections had consisted of the medium without the active principle, the treatment neither giving rise to ptyalism nor cure of the disease.

From the observations here made I conclude that the diagnostic value of the test in early cases is very consider-

able, allowing us after ten weeks following infection, or less, to come to a correct conclusion. In no case of chancroid or gonorrhoea in which syphilitic symptoms afterwards developed did I fail to get a positive reaction, and in no uncomplicated non-syphilitic lesion was a positive result ever obtained. The usefulness of the test for clearing up the diagnosis in obscure and doubtful late syphilitic lesions has been abundantly proved.

II.—*Variation of the Reaction.*

During the course of this eighteen months' study for diagnosis, employing the three methods above stated, some differences have been noted in the results obtained.

1. Fleming's method. All the serums were tested about six hours after the blood was collected; a spirit extract of syphilitic heart was used as antigen. In many haemolysis of the sheep cells was not complete, but was sufficiently definite to contrast with the "test" tube. Out of 1,100 serums tested, 10 per cent. I found failed to haemolyze the sheep's cells at all; these were not recorded for the specific test. As it is stated that normal blood will at times give a positive reaction by this method, a large number of serums from medical officers and others were examined here; in none of these did I obtain a positive reaction for syphilis. Of the cases for diagnosis, excluding the 10 per cent. which failed to haemolyze at all, the reactions were always correct. In 32 cases (3 per cent.) the positive reaction was obtained earlier than when using the inactivated serum in the ordinary way, as proved by repeated further examinations of the serum, and by the clinical course of the cases. This method, therefore, seems to be an easy and most useful procedure, acting as an excellent check on other methods employed, and is particularly valuable when very little serum is obtainable.

2. The second or original method, using alcoholic extract of congenital liver for antigen, inactivated "test" serum, sheep's blood cells, standardized haemolytic serum and fresh guinea pig serum. This method was employed in every case, all control tests being carried out each week, before commencing the diagnostic series.

3. A modification of the above suggested by McDonagh. The serums were examined twenty-four or more hours after the blood was obtained; using two rows of test tubes containing respectively 0.5 c.cm. of saline solution and complement in one, and saline solution complement with antigen in the other, to both of which 0.25 m. of *unheated* "test" serum was added, and after one hour's incubation the necessary haemolytic serum mixed with them, again incubated and finally read off.

This latter procedure with me gave better results than those obtained when using the heated serum, agreeing generally with the readings by Fleming's method, but without the 10 per cent. of failures; when used with efficient controls it appeared to be the most reliable of the three methods.

VI.—Ivy McKenzie, M.B.,

INDIVIDUAL PROPERTIES OF COMPLEMENT AND ORGAN EXTRACT.

A method which is commonly adopted in carrying out the Wassermann reaction depends on the action of a mixture of organ extract and serum on an arbitrarily fixed amount of complement; this amount is, as a rule, 0.1 c.cm. of fresh guinea-pig serum when 1 c.cm. of a 5 per cent. suspension of sensitized ox red blood corpuscles is added after the serum, organ extract, and complement have been in contact for an hour and a half at 37° C. This procedure of observing the effect on a fixed amount of complement would not be open to objection were it not that the complement itself, and also the extract, are variable factors in the reaction. If 0.1 c.cm. of fresh guinea-pig's serum represented a constant number of haemolytic doses for the test corpuscles to be used, and if equal quantities of two different samples of complement behaved similarly in the presence of the same syphilitic serum and organ extract, then the employment of a definite amount of complement in the experiment would be the most simple and satisfactory method of carrying out the test. There is ample evidence, however, to show that considerable variations may manifest themselves in fresh guinea-pig's serum as regards (1) the amount of the minimum haemolytic dose; and (2) the deviability of the complement by organ extract alone, and by serum and organ extract, as measured in haemolytic doses.

The minimum haemolytic dose of the complement containing serum is measured as follows: A dilution of one part of the serum is made with three parts of normal saline, and of this 0 01. 0.02, 0.03, 0.04, 0.05, 0.06 c.cm are added to a series of tubes, each containing 1 c cm. of a 5 per cent. suspension of ox red blood corpuscles fully sensitized (five times the minimum haemolytic dose of immune body being the amount of maximum sensibilization for guinea-pig's complement) with the homologous immune serum of a rabbit. The tubes are placed at 37° C., and after shaking every quarter of an hour, the result is read at the end of an hour, and the amount of complement in the first tube in which haemolysis is complete is regarded as the "dose." It has been found that if kept in an ice chest the haemolytic dose of complement in guinea-pig's serum may vary very little in three or even in four days; the dose, however, of complement from different samples of serum may exhibit considerable variation; serums of the same age have with the same test corpuscles varied in dosage from 0 0025 c.cm. to 0.015 c.cm. Thus, if the complement of 0 01 c cm. of guinea-pig's serum must be absorbed before a Wassermann reaction is regarded as positive, this amount of serum may represent in one case forty doses of haemolytic complement and in another case barely seven.

Again, the serum complement may show great variation in deviability, and the variation in this property of the complement manifests itself as regards the inhibiting influence both of organ extract alone, and also of organ extract along with syphilitic serum.

Among the factors which determine such variability, the following must be taken into consideration:

1. The turbidity of the emulsion of organ extract with the saline solution.
2. The age of the complement-containing serum.
3. Individual properties independent of age and of the turbidity of the emulsion of organ extract.

1. *The Turbidity of the Emulsion of Organ Extract.*—When the alcoholic extract of a minced organ is added to normal saline, the turbidity of the resulting mixture depends on the way in which the mixture is made, even when the same proportions of extract and saline are used. The usual proportion of extract to saline solution is 1 to 5. If the extract be added rapidly and the mixture shaken up quickly, the resulting mixture or emulsion is comparatively clear; if, however, the extract be floated on the top of the saline solution, and mixture be produced by gradual rotation of the tube, then the resulting emulsion will be comparatively turbid. It has been found that, as a general rule, a turbid emulsion deviates more complement than a clear emulsion, and in the presence of a syphilitic serum proportionately more complement is deviated by a turbid emulsion with serum than by a clear emulsion with the same serum. Table I is taken from an experiment in which this phenomenon was observed.

Table I.

	Amount of Complement.	Result.
Turbid emulsion of organ extract alone 0 6 c.cm.	0.025 c.cm. (5 doses)	No lysis.
	0 03 c.cm. (6 doses)	Trace of lysis.
Clear emulsion of organ extract 0.6 c.cm.	0 01 c cm. (2 doses)	Almost complete lysis.
	0.015 c.cm. (3 doses)	Complete lysis.
Turbid emulsion of organ extract 0 6 c cm. + 0.1 c.cm. syphilitic serum	0.15 c.cm. (30 doses)	Trace.
	0.2 c.cm. (40 doses)	Complete lysis.
Clear emulsion of organ extract 0 6 c cm. + 0.1 c.cm. syphilitic serum	0.1 c.cm. (20 doses)	Almost complete lysis.
	0.15 c.cm. (30 doses)	Complete lysis.

Here it is seen that the turbid emulsion alone absorbs more than twice as much complement as the clear emulsion; and in the presence of syphilitic serum almost twice as much complement is absorbed by the turbid emulsion as by the clear emulsion. It is also to be noted that if the result were read according to the single tube method a negative result would be recorded with the clear extract (0 1 c.cm. complement, almost complete lysis), whereas with the turbid emulsion the result would be positive.

2. *The Age of the Complement-containing Serum.*—In general, the age of the complement-containing serum is a factor affecting the deviability of the complement; after standing for upwards of twenty-four hours in the ice chest, although there is little or no diminution in the amount of the haemolytic dose, the complement becomes less deviable, both by the emulsion of organ extract alone and by the emulsion along with syphilitic serum. Table II gives an example of the difference between a fresh and an old complement in this respect.

TABLE II.

	Complement I (Four Days old).		Complement II (Fresh).	
Syphilitic serum (half hour at 57° C.) 0.05 c.cm. + turbid emulsion of organ extract 0.6 c.cm.	0.096 c.cm (12 doses)	No lysis	0.09 c.cm. (11¼ doses)	No lysis.
	0.144 c.cm (18 doses)	Trace of lysis	0.15 c.cm. (18¾ doses)	,,
	0.192 c.cm. (24 doses)	Marked lysis	0.2 c.cm. (25 doses)	,,
	0.24 c.cm. (30 doses)	Lysis just complete	0.25 c.cm. (31¼ doses)	Faint trace of lysis.
	—	—	0.3 c.cm (37½ doses)	Marked lysis.
	—	—	0.35 c.cm. (43¾ doses)	Lysis just complete.

From Table II it is seen that, although the haemolytic dose is identical in the two complements (0.008 c.cm.), the fresh complement (II) is deviated to a greater extent, both by the extract alone and also by the extract along with the syphilitic serum. In combination with the syphilitic serum, 0.192 c.cm. of Complement I (24 doses) gives marked lysis, whereas with Complement II 0.3 c.cm. (37½ doses) is required to cause the same amount of lysis, and the same ratio holds with respect to the amounts necessary to produce just complete lysis. Accordingly the deviating power of the syphilitic serum in presence of the same amount of the same organ extract is half as great again when measured with a fresh complement as it is with an old complement, although the haemolytic power of both complements is identical.

It is difficult to find a satisfactory explanation for such individual variations in complements. The possibility of conversion of complement into complementoid on standing naturally suggests itself, but the fact that there is not a corresponding fall in haemolytic value makes such an explanation improbable. It might also be supposed that when a complement was only slightly absorbed by an organ extract or by a mixture of organ extract and syphilitic serum this was due to the presence in the guinea-pig's serum of a natural immune body for ox corpuscles which was specially suited to act in conjunction with the guinea-pig's complement. Browning and the writer have, however, shown that this is not so.

The lytic power of three complement-containing serums was tested as follows:

Complement I (three days old), dose = 0.01 c.cm. With extract alone—2 doses = lysis complete.
Complement II (twenty-four hours old), dose = 0.0075 c.cm. With extract alone—2 doses = lysis complete.
Complement III (fresh), dose = 0.0075 c.cm. With extract alone—2 doses = lysis complete.

Taking 1 c.cm. of a 5 per cent. suspension of washed ox corpuscles, 0.1 c.cm. of Complement I produced only a trace of lysis; 0.1 c.cm. of Complement II produced no lysis; 0.1 c.cm. of Complement III produced almost complete lysis (incubation for one and a quarter hours at 37° C., reading taken next day).

Thus Complement III, though possessing much more natural immune body than I or II, was absorbed to as great an extent as I or II. Further, the natural immune body was removed from Complement III by treatment with washed ox blood at 0° C. (0.26 c.cm. of the treated serum caused no lysis of 1 c.cm. of ox blood suspension), yet the complement of the treated serum was not inhibited to a greater extent than that of the untreated.

In the same way, experiments were done to test whether the amount of complement absorbed by organ extract together with syphilitic serum was influenced by the amount of natural immune body for the test corpuscles in the complement-containing serum. These same three serums were tested both in the untreated condition, and also after being in contact with washed ox blood at 0° C. Table III gives the result of this experiment.

This experiment shows that in spite of the fact that Serum III contained a considerable amount of immune body for ox corpuscles, still exactly the same number of doses of complement was absorbed from the treated as from the untreated serum. The estimation of the haemolytic value of the treated as compared with the untreated serums showed a slight falling off in the former, probably due to dilution. Thus the fresh serum (III) is deviated to a greater extent than the older serums, even although it contained the largest amount of natural immune body from the ox corpuscles. Again, the variation in deviability of different complements does not depend on the procedure by which the complement containing serum is obtained. Certain serums were obtained by immediately defibrinating the blood, and then centrifugalizing off the serum; in other instances the blood was allowed to clot, and the serum allowed eighteen to twenty-four hours to separate; serums obtained in both ways were used fresh, and kept on ice, and compared under these varying conditions, but no definite and constant difference could be attributed to the variation in the procedure.

3. *Properties Independent of Age and Turbidity.*—Specimens of complement-containing serum have occasionally been encountered which were so sensitive to the organ extract emulsion as to render their use in the Wassermann test impossible. In three such instances the extract alone absorbed the complement in 0.06, 0.08, and 0.1 c.cm of the serum. All the serums which were tested in these experiments, including negative controls, gave positive results. In such cases the results must be discarded, and the experiments repeated with complement which is less sensitive. In one of these three specimens this peculiar sensitiveness was absent when forty-eight hours old, although present when twenty-four hours old. Whether this extraordinary sensitiveness is an extreme example of the property of deviability already described in fresh complement-containing serum has not been determined.

Properties of the Emulsion.

The properties which come under consideration are:

1. The turbidity of the emulsion of organ extract.
2. The lytic effect of the extract on the test ox corpuscles.

1. *Turbidity of the Organ Extract Emulsion.*—Reference has already been made to the fact that the turbidity of the emulsion depends on the manner in which the extract and saline solution are mixed. It has also been seen that more complement is deviated by a turbid emulsion with syphilitic serum than by a clear emulsion. As normal serums do not, with a normal complement, produce a deviation of complement when a turbid emulsion is used, it is advisable in every instance to employ a turbid emulsion. Syphilitic

TABLE III.

	No. of Doses of Complement.	Complement I (Three Days old).		Complement II (Twenty-four Hours old).		Complement III (Fresh).	
		Untreated.	Treated.	Untreated.	Treated.	Untreated.	Treated.
Syphilitic serum (half-hour at 57° C.) 0.05 c.cm. + turbid emulsion of organ extract 0.6 c.cm.	7	No lysis	No lysis	No lysis	No lysis	No lysis	No lysis
	10	Faint trace of lysis	,,	Trace of lysis	Distinct trace of lysis	,,	,,
	15	Very marked lysis	Trace of lysis	Lysis just complete	Lysis just complete	Very faint trace of lysis	,,
	20	Complete lysis	Complete lysis	Complete lysis	Complete lysis	Trace of lysis	Trace of lysis
	30	,,	,,	,,	,,	Complete lysis	Complete lysis

serums which react only weakly with a turbid emulsion do in some cases react negatively with a clear emulsion.

2. *The Lytic Effect.*—The extract by itself should not have a lytic effect on the test corpuscles, otherwise it is impossible to estimate the influence of the extract on the complement. In performing the test an estimation should be made of the amount of complement absorbed by the serum alone, and also by the extract alone. A true deviation results only where the amount absorbed by the serum along with the extract exceeds the sum of the amounts absorbed by serum and extract alone. Now, if the extract has a lytic effect on the corpuscles, its effect on the complement cannot be estimated, and thus a control which is indispensable to a thorough test is left out.

Again, under some circumstances, and especially when the single tube method is employed, a lytic extract may with a normal serum give what is apparently a positive reaction. The possible fallacy from using a lytic extract should be emphasized in view of the fact that its use has recently been recommended, and in view of the fact that some authorities still persist in advocating the advantages of extract of syphilitic liver in the test. A syphilitic liver is, as a rule, either undergoing autolysis or in a state of fatty degeneration when obtained. An alcoholic extract of such livers is often lytic for ox corpuscles in the amounts used for the Wassermann test; and, if not lytic, it contains at least substances which have a lytic effect on ox corpuscles in greater amount than an extract of normal liver. The apparent advantage of using an extract of syphilitic liver is undoubtedly to some extent due to the abnormal amount of fatty substances which it contains. A syphilitic liver containing spirochaetes and without autolytic change or fatty degeneration was extracted with alcohol and the extract used in the Wassermann test. Titration against an alcoholic extract of guinea-pig's liver showed that it did not, with syphilitic serum, deviate more complement than the latter. Now, it has been found that the lytic property of an alcoholic extract of tissue can be inhibited by the addition of blood serum; and it has been suggested that when a lytic extract is employed in the Wassermann test its lytic effect is inhibited by the serum whose syphilitic property is being tested. This would, of course, depend on two things—first, on the strength of the lytic effect of the extract, and, secondly, on the inhibiting power of the serum. Extracts are known to vary considerably in their lytic effect on blood corpuscles, and Cruickshank has found that serums vary in their inhibitory effect on the same extract. If the serum employed has not a complete inhibitory effect on the lytic property of the extract, then part of the guinea-pig's complement-containing serum is used in the inhibitory process, and the complement is thus destroyed. In this way, with an extract of a certain lytic strength, a negative serum may appear to give a positive Wassermann reaction.

In view of these variations in the complement and organ extract, attention is drawn to the following precautions:

1. It is advisable to estimate the deviation in terms of the number of haemolytic doses absorbed by serum and organ extract, in addition to the number absorbed by serum and organ extract alone.
2. The complement-containing serum should be allowed to stand twelve to twenty-four hours before use, and should not be more than three days old.
3. The results obtained from the employment of a complement which is specially sensitive to the organ extract emulsion should be discarded.
4. The organ extract emulsion should be turbid, and should not be lytic for the test corpuscles.
5. Negative and positive serums should be used as controls in every experiment.

VII.—H. R. Dean,
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COMPARISON OF THE ORIGINAL WASSERMANN METHOD WITH SOME OF ITS MODIFICATIONS.

Relative Value of Different Methods.

One of the most interesting as well as the most difficult questions in connexion with the Wassermann reaction is that which deals with the relative value of the various methods of preparing the extract. So long as we remain ignorant of the actual nature of the antigen it seems hardly possible to deal with the question from a quantitative standpoint.

Supposing that we compare two extracts—the one made from the liver of a congenital syphilitic, the other from a normal guinea-pig's heart, we are not so much comparing the methods of preparation as the relative richness in antigen of two chance specimens. One guinea-pig's heart will differ considerably from another, and no two specimens of liver will be found to be equally rich in antigen. It seems to me impossible at the present time to make a quantitative comparison between extracts of normal and syphilitic organs. On the other hand, it is possible to draw some sort of conclusion by testing a number of serums against two extracts and noting the results.

I have records of 195 cases in which I have compared an alcoholic extract of normal guinea pig's heart and a saline extract of syphilitic liver. Of these 195 cases a positive result was obtained with the liver extract in 31 cases and with the extract made from normal guinea-pig's heart in 22 cases. In 1 case only was a positive result obtained with the alcoholic, but not with the watery extract. The extracts used in these experiments had been carefully tested and found to be good; that is to say, they had been found to give a positive reaction in very small doses whan titrated with test serums from undoubted cases of secondary syphilis.

The majority of the 195 cases which I have quoted formed part of a series of cases of children who were examined with a view to establishing a diagnosis of congenital syphilis, and the large majority of the cases which gave a positive result showed no other evidence of syphilis. On the other hand, I have never been able to demonstrate any difference between extracts made from normal and syphilitic organs in testing serums from cases of obvious secondary and tertiary syphilis. The class of case in which I have found a difference in the result between the extracts made from normal and syphilitic organs has unfortunately been that in which the serum diagnosis could not be confirmed in a satisfactory manner by clinical findings. Although I am inclined to the opinion that the extract made from syphilitic material is a more delicate reagent, it is not possible to exclude the view that it is actually too delicate. On the whole, I am inclined to think that in cases of congenital syphilis, and in those cases in which many years have elapsed since the supposed infection, the watery extract of syphilitic liver is greatly to be preferred. The question is very important from a practical standpoint, because it is only in latent and obscure cases that there is any real necessity for the serum reaction as an aid to diagnosis.

Another very important point with regard to the extract is its titration and standardization. It is absolutely essential to titrate a new extract in falling doses against several authenticated positive and negative serums. Extracts vary very considerably in strength and properties, and it is not safe to use a fixed dose of a fixed dilution without ascertaining if it is appropriate to the particular extract in use. It is necessary to determine the dose in which an extract without addition of serum will absorb complement, the dose in which complement is absorbed in the presence of normal serum, and the dose which, in the presence of positive serum, will bind the complement. A good extract is one which shows a large difference in the dose necessary for the fixation of complement in the presence of syphilitic and normal serum. An extract dose should be selected which can be relied on to give a positive reaction with a syphilitic serum, and which at the same time is less than half the amount which binds complement in the presence of normal serum.

Extracts should be tested before coming into use, and at fairly frequent intervals, to guard against deterioration in the qualities of the extract, which deterioration is in the case of the watery extracts often very unpleasantly sudden. Adequate standardization of the extract can, I think, be only carried out by the use of a haemolytic system which can itself be standardized, that is to say, there must be added to each tube a known definite amount of haemolytic serum and a known amount of complement. A titration which relied on the normal amboceptor and normal complement present in fresh human serum would afford little evidence which would be of service in performing experiments with other serums.

One of the great objections to all modifications which make use of the normal complement is that the worker can form no opinion of the power of the particular dose of extract to absorb complement in the presence of normal serum. In several of the modifications commonly used reliance is placed on the normal amboceptor for sheep's corpuscles which is present in human blood. I examined 50 serums to ascertain their content of normal haemolytic amboceptor for sheep cells.

The tubes were made up to a bulk of 2.5 c.cm., and contained 0.5 c.cm. of a 1 in 20 suspension of sheep's corpuscles, and 0.5 c.cm. of a 1 in 10 dilution of fresh guinea-pig serum. The tubes were incubated for two hours at 37° C. The human serums were inactivated and used in various doses. Of the 50 serums haemolytic amboceptor was absent in 2 cases; in 7 cases haemolysis was incomplete with a dose of 0.1 c.cm.—that is to say, the dose usually employed in the performance of the serum reaction for syphilis. In 4 cases complete haemolysis was produced by 0.1 c.cm. serum; in 9 cases complete haemolysis was produced by 0.05 c.cm. serum; in 9 cases complete haemolysis was produced by 0.025 c.cm. serum; in 17 cases complete haemolysis was produced by 0.0125 c.cm. serum; in 1 case complete haemolysis was produced by 0.005 c.cm. serum.

Thus 0.1 c.cm. serum was found to contain in one case twenty minimal haemolytic doses, in 17 cases eight doses, in 9 cases four doses, in 9 cases two doses, in 4 cases one dose, in 7 cases less than one dose, and in 2 cases no haemolysis occurred.

The amount of normal haemolytic amboceptor is a variable factor, even in the original method; but in the original method the only question which arises relates to possible presence of excess of amboceptor. In the case which I mentioned in which 0.1 c.cm. of serum contained twenty minimal haemolytic doses, a marked positive result was obtained without any particular precautions being observed.

To further test the effect of excess of haemolysin on the reaction, the following procedure was employed:

Several serums, known to give a positive reaction, were absorbed with sheep's corpuscles in the cold. The normal amboceptor for sheep's corpuscles was in this way removed, and its removal was proved by experiment.

The treated serums (from which the haemolytic amboceptor had been removed) were then titrated with falling doses of extract, and a similar series of tubes were put up containing similar amounts of extract and of the untreated serums. It was found that the intensity of the reaction had been but little influenced by the removal of the normal amboceptor—that is to say, the untreated serum gave almost as marked a reaction as the serum from which normal amboceptor had been removed. A sufficient dose of a haemolytic serum (rabbit v. sheep) was, of course, added to each series of tubes.

The result indicates that a positive reaction is in no great danger of being masked by excess of the normal amboceptor.

In Bauer's and Hecht's method reliance is placed on the normally present amboceptor. The danger lies, I think, not in the few cases in which the amboceptor is completely absent, but in those cases where just sufficient is present in the control tube, which contains serum alone, to produce complete haemolysis. In those cases the presence of extract will just upset the balance, and by the absorption of a certain amount of complement a positive result will be simulated. The presence of a known normal and a known syphilitic serum with extract does not afford adequate controls, for the control negative serum may have an unusually powerful haemolytic system.

The normal complement is not so variable; nevertheless, considerable variations do occur. In an examination of 90 serums I found haemolytic complement apparently absent in 2 cases, and in 3 cases the amount present was very small. I examined 87 serums by Wassermann's method, and by the method of M. Stern. Of these, 14 were positive by the original method, and 23 by Stern's method. The 87 serums were also tested for presence and amount of haemolytic complement. Of the 9 cases which were positive by Stern's method and negative by Wassermann's method, 4 could be shown to be unusually deficient in complement.

Another factor in producing a relatively high percentage of positive results is probably the use of unheated serum. Sachs and Boas have shown that the serum of an undoubted syphilitic will give a positive reaction in greater dilution before it is heated. Boas has further shown that during progress of mercurial treatment a positive result can be demonstrated for a longer period by the use of unheated serum. Nevertheless, evidence has accumulated that fresh serum of non-syphilitics is apt to give a positive reaction.

It seems to me that the original method is safer for the reason that it permits of the standardization of the reagents and the putting up of adequate controls. The reaction is a quantitative one, and we consider a serum to give a positive result which gives in the presence of extract a very much more marked fixation of complement than a normal serum. We may arrive at our result either as Dr. McKenzie has suggested by varying the dose of complement or by the previous titration of the extract with a view to the determination of the dose which fixes complement with syphilitic but not with normal serum. The variations in the complement content of the guinea-pig serum are, I think, quite adequately met by the routine titration of the haemolytic system before the commencement of the actual test, and the use of a dose of haemolysin which, acting in conjunction with a particular complement-containing serum, contains three minimal lytic doses. The variations in the complement are, I think, in practice adequately compensated by varying the dose of the haemolytic amboceptor.

Reliable results can only be obtained by employing a method which allows of a standardization of the reagents employed, and in which controls can be used which disclose all possible sources of error; and although various modifications have been employed with considerable success, the evidence at our disposal is enormously in favour of the original method.

VIII.—L. W. HARRISON, Captain, R.A.M.C.

THE GUIDANCE AFFORDED BY COMPLEMENT FIXATION METHODS.

SYPHILIS is, unfortunately, a very important disease in the army, and the value of the Wassermann test, from the points of view of diagnosis and of regulating treatment, has been recognized by the Army Medical authorities for some time. It has been my privilege to conduct an investigation at the Military Hospital, Rochester Row, into the value of the reaction from these standpoints, and, though the investigation is as yet in its infancy, some points have arisen which may be of interest to you.

As you are probably aware, when a soldier is found to be suffering from syphilis all the particulars relating to his complaint and its treatment are entered on a special case-sheet, which is attached to his other documents and accompanies him wherever he goes. In this way he is kept continually under supervision while he is serving with the colours, and his treatment pursues, as far as possible, a perfectly regular course.

The advantage, from the point of view of the Wassermann test, is that at the same time as a syphilitic soldier's blood is tested for this reaction a perfect record of his clinical progress and his treatment is available, and it is possible to correlate all the particulars with the result of the test.

As it was necessary to ascertain if the two years' treatment, which is customary in the army, was sufficient as judged by the Wassermann reaction, I had to search for the most delicate and yet reliable method of conducting the test. As a result of a number of experiments, I found that by heating the serum at 55° C. for ten minutes only (which is sufficient to destroy its natural complement), as compared with the usual half-hour, a very considerable gain in the percentage of positive reactions in these well-treated cases was obtained, though the difference might not be so apparent in the untreated and early cases. At the same time, the uncertain element introduced by omitting to destroy the natural complement was eliminated, and, while maintaining the reliability of the original technique, the test approached such modifications as Hecht's and Stern's in delicacy.

I have found it an advantage in estimating the effect of treatment to test the serum in a roughly quantitative manner by putting it up with two different amounts of complement (on the lines suggested by McKenzie), one corresponding to 0.1 c.cm. fresh guinea-pig serum, on

which I standardize my reagents, and the other corresponding to 0.2 c.cm.

I have obtained the following results, which illustrate the effect of treatment on the reaction:

	Positive 0.2 % Complement.	Positive 0.1 % Complement.	Total Positive.	Total Negative.	Percentage Positive.
Untreated syphilitics, including primary cases from the fifteenth day ...	66	19	85	6	93.5
Syphilitic cases:					
After 1 course of treatment	17	29	46	9	83.6
After 2 courses ,,	24	14	38	11	77.5
After 3 ,, ,,	8	19	27	15	64.5
After 4 ,, ,,	3	14	17	13	56.5
After 5 ,, ,,	4	13	17	17	50.0
After 6 ,, ,,	3	6	9	17	34.6
After 7 ,, ,,	5	11	16	13	55.0
After 8 or more ,,	0	3	3	11	21.5

You will notice that as treatment progressed there was a marked falling off in the percentage of positive reactions with the double amount of complement (0.2 c.cm.) as well as in the totals which gave the reaction at all.

The table shows an increase in the percentage of positive reactions given by serums of cases which had received seven courses as compared with those which had received six, and I think that this apparent anomaly is to be explained by the fact that the cases under this heading included a number of men who had passed to the Reserve but had voluntarily persevered with treatment on account of persisting symptoms.

Taking a positive reaction as a certain indication to persevere with the treatment, it appears clear that two years is not a sufficiently long period to lay down as a routine measure for the treatment of this disease.

Regarding the modifications which have been introduced on the claims of greater simplicity and of delicacy, such as Hecht's and Stern's, I have practical experience only of Stern's, though I have seen a considerable number of tests conducted by Colonel Birt, using Fleming's modification of Hecht's technique.

I think that, in conjunction with a technique on the original lines, the employment of one of these modifications is a considerable advantage on account of its superior delicacy when estimating the effect of treatment, but for diagnostic purposes all of them suffer from an inevitable objection of which I have practical experience. If a serum be deficient but not entirely devoid of complement, the extract may cause absorption of the modicum of complement in it, even though it be a normal serum, and yet this small amount of complement, unhampered by the extract, may be sufficient to cause perfect haemolysis in the control tube.

I do not believe this test can be carried out by the practitioner in the course of his other duties, and being in any case a laboratory procedure, I do not think that the modifications which have been introduced give a sufficient gain in simplicity to justify their substitution for a technique based on the original lines of keeping the reagents for the test as far as possible constant, and one therefore under more perfect control.

IX.—Carl H. Browning, M.D.,
Lecturer on Bacteriology in the University of Glasgow.

LECITHIN AND CHOLESTERIN AS REAGENTS FOR THE DETECTION OF SYPHILITIC SERUMS.

It is now generally agreed that for the detection of syphilitic serums by the complement-deviation method the most suitable form of antigen is an alcoholic tissue extract. The fact that the active substances were soluble in alcohol led to the supposition that they were of lipoid nature. Accordingly a number of such lipoid bodies have been tested in the Wassermann reaction, and also mixtures of these compounds, such as that of Sachs and Rondoni,[1] have been employed; but, so far, the crude extract has proved superior to any of these combinations. As the question of the properties of alcoholic extracts in regard to the syphilis reaction has already been dealt with (McKenzie) I shall consider the action of the two tissue constituents—lecithin and cholesterin—which we have found to act as very delicate reagents for the demonstration of changes in serum due to syphilitic infection (Browning, Cruickshank, and McKenzie[2]). Lecithin by itself has only a moderate capacity for absorbing complement in the presence of syphilitic serum, as many workers have found.

We have used lecithin prepared from the dried residue of a crude alcoholic extract of fresh ox liver.

The residue is extracted with ethyl acetate at 60° C. and the solution filtered. The portion which falls out in the cold is dissolved in ether and precipitated with acetone (the ordinary commercial "pure" reagents serve for this purpose); the process of dissolving in ether and precipitating with acetone is repeated twice again, and finally the precipitate is treated with absolute alcohol in a mortar till the soluble portion has been extracted. In this way a solution of "pure" lecithin is obtained, of which the lytic dose for ox blood corpuscles is three to six hundred times the amount which causes lysis in the presence of cobra venom. For the Wassermann test 1 volume of 0 75 per cent. lecithin in alcohol is diluted with 7 volumes of salt solution so as to make the emulsion as turbid as possible. A series of tubes containing 6 c.cm. of this emulsion mixed with 0.05 c.cm. of the serum, previously heated at 57° C. for thirty minutes, are then used to estimate the power of absorbing the complement of guinea-pig's serum. After the mixture of emulsion, patient's serum, and complement has stood for one and a half hours at 37° C., the test blood suspension—1 c.cm. of 5 per cent. washed ox blood sensitized with five doses of immune body from the rabbit—is added to each tube. After one and a quarter hours' further incubation the tubes are set at room temperature and the result read next day.

We have found that in the presence of powerful syphilitic serums a very considerable amount of complement may be absorbed by the lecithin; on the other hand, with less powerful serums, no more complement is absorbed than in the presence of the serums of normal individuals. When *cholesterin* is added to such an alcoholic solution of lecithin a considerable amount is dissolved.

To the 0.75 per cent. alcoholic lecithin solution cholesterin is added in excess, and the mixture is shaken repeatedly. As saturation occurs only slowly at room temperature, the mixture should be allowed to stand for a week before the clear fluid is used. On dilution with salt solution, as in the case of the lecithin, a uniform emulsion results.

In the presence of syphilitic serum the lecithin-cholesterin emulsion leads to the absorption of more complement than is absorbed by the equivalent amount of lecithin emulsion in the absence of cholesterin. With negatively reacting serums the emulsions of lecithin and of lecithin-cholesterin practically always absorb the same amount of complement. Thus, with 70 negative serums, the lecithin-cholesterin emulsion only once absorbed as much as one dose more than the lecithin emulsion. Further, the inhibitory effects of the emulsions of lecithin and of lecithin-cholesterin by themselves on complement are almost always equal. In 42 experiments the amount of complement absorbed by lecithin-cholesterin emulsion alone only twice amounted to as much as one dose more than the amount absorbed by the lecithin emulsion.

In this respect the lecithin and the lecithin-cholesterin behave much more uniformly with different specimens of complement than crude extract does. The following table

No. of Experiment.	No. of Doses of Complement Absorbed by Emulsion of—		
	Lecithin.	Lecithin-cholesterin.	Crude Extract (Ox Liver).
I	0.3	1	3 5+
II	1	1	2
III	3	3	5
IV	2	2	2
V	2	1	4
VI	1.5	2	6+
VII	1	1	1
VIII	2.5	2 5	5
IX	1.5	2	
X	1	1	2.5

shows the number of doses of complement absorbed by emulsions of lecithin, lecithin-cholesterin, and crude extract of fresh ox liver respectively when tested simultaneously in a series of experiments.

The practical value of lecithin and cholesterin as reagents for the diagnosis of syphilitic serums has been established by Dr. Gilmour, who has examined in this way upwards of 150 serums, fully half of which were from syphilitic or parasyphilitic cases; at the same time, by way of control, the behaviour of the serums with crude alcoholic extract of ox liver was tested. Five or six serums were examined with the same specimen of complement at one time, and the testing of each serum necessitated the use of upwards of twenty tubes. The method adopted was to estimate accurately the amount of complement absorbed by the patient's serum along with emulsions of lecithin and of lecithin-cholesterin respectively. Where the series containing serum and lecithin-cholesterin shows more complement absorbed than the series with serum and lecithin alone, then the reaction is positive. Even a very small difference in the two series (two to three doses of complement more absorbed with lecithin-cholesterin than with lecithin) is in favour of the serum being syphilitic, and a more marked difference (five doses or more) is practically conclusive under the conditions laid down.

In every instance, of course, the complement-inhibiting power of the serums and the emulsions by themselves were carefully measured. It is also of great importance always to test a known negative serum. The following are the details of a characteristic experiment:

Serum.	No. of Doses of Complement Absorbed with—		
	Lecithin.	Leithin-cholesterin.	Crude Extract.
Syphilitic	4	18	20
Normal	3	3	4

Controls: Lecithin alone absorbed 1½ doses; lecithin-cholesterin alone absorbed 1½ doses; crude extract alone absorbed 3 doses; syphilitic serum alone absorbed 1 dose; normal serum alone absorbed ½ dose.

We have found that it is only by the use of these long and precise quantitative methods that the numerous possibilities of error in such tests can be minimized.

The absolute amount of complement fixed by lecithin-cholesterin emulsion along with syphilitic serum is in most cases somewhat inferior to that absorbed with crude extract, but at the same time the crude extract by itself usually absorbs more complement than lecithin-cholesterin. We have found, however, that certain serums repeatedly absorb more complement with lecithin-cholesterin than with crude extract, so that the result is independent of the complement used. This fact serves to emphasize how complicated the nature of the processes involved in the Wassermann reaction must be.

In the ordinary method of carrying out the test with an alcoholic organ extract the criterion of a positive reaction is, of course, the absolute amount of complement absorbed (measured in haemolytic doses) as compared with the amounts absorbed in the controls. Now it has been found that frequently the complement is abnormally susceptible to the inhibitory action of the extract or the heated serum. Along with such deviable complements a normal serum may cause the absorption of much more complement than the sum of the amounts absorbed by serum and emulsion separately, so that the reaction is apparently positive. For this reason McKenzie and I[3] have suggested that where the extract alone absorbs more than four doses of complement the results should be rejected. In a series of forty estimations made by Dr. Gilmour and myself the results were on ten occasions vitiated by the use of complements which were abnormally deviable so far as the crude extract was concerned. On the other hand, with the lecithin cholesterin method, where the difference of the amounts of complement absorbed in the two series is taken into account, we have found that with highly deviable complements two serums absorbed the same amount of complement in the presence of lecithin; but, on the addition of cholesterin, the one absorbed much more complement, thus showing its syphilitic character, whereas the other from a non-syphilitic subject deviated exactly the same amount as without cholesterin. The advantage of the use of lecithin and lecithin-cholesterin is thus apparent. The following is an illustrative experiment:

Serum.	No. of Doses of Complement Absorbed with		
	Lecithin.	Lecithin-cholesterin.	Crude Extract.
Syphilitic	8	24	24
Normal	9½	9½	9½

Controls: Lecithin alone absorbed 3 doses; lecithin-cholesterin alone absorbed 2 doses; crude extract alone absorbed 2 doses; syphilitic serum alone absorbed 2 doses; normal serum alone absorbed 3½ doses.

It is notable that the proportional increase in the amount of complement absorbed under the influence of cholesterin is often especially marked in the case of weakly positive serums. Thus, in the following experiment a strong and weak positive serum were tested at the same time:

Serum.	No. of Doses of Complement Absorbed with	
	Lecithin.	Lecithin-cholesterin.
Weak syphilitic	3	15
Powerful syphilitic ...	20	36

Controls: Lecithin alone absorbed 1 dose; lecithin-cholesterin alone absorbed 1 dose; serums alone absorbed 1 dose.

With regard to the mechanism of the specific action of lecithin-cholesterin with syphilitic serums, little can be said as yet. Along with Dr. Cruickshank I have tested the effect of a number of cholesteryl-esters, together with lecithin and syphilitic serum, and we have found that they all possess in some degree the power of increasing the amount of complement absorbed. Thus it would appear that the intact condition of the alcoholic hydroxyl group of cholesterin is not absolutely essential for the reaction.

REFERENCES.
[1] Sachs and Rondoni, *Zeitsch. f. Immunitätsforsch.*, 1909, Bd. I, p. 132. [2] Browning, Cruickshank, and McKenzie, *Journ. of Path. and Bact.*, 1910, vol. xiv, p. 484. [3] Browning and McKenzie, *Lancet*, 1909, vol. i, p. 1521.

X.—J. O. WAKELIN BARRATT, M.D., D.Sc.

COMPLEMENT DEVIATION IN RELATION TO CARCINOMA.

IN relation to carcinoma the production of antibodies has been studied by many observers by means of selective absorption and of complement deviation, but progress in this direction has been limited by the lack of specificity which the antibodies obtained exhibited. Although the second of these methods is not as yet available for purposes of diagnosis in carcinoma, and it is doubtful if it will be so in the future, nevertheless, it may at this juncture be of interest in connexion with the Wassermann reaction to allude briefly to the occurrence, in the serum of the subjects of carcinoma, of substances which, when employed in conjunction with tumour extract, produce complement deviation.

In connexion with human carcinoma the method of complement deviation has been employed by Ranzi with negative result and, more recently, by Lüdke with positive result.

In relation to mouse carcinoma and also to human carcinoma I have been able to make some observations, which may here be briefly described, full details being reserved for a paper shortly to be published. In these experiments an attempt was made with the aid of the inactivated serum of the subject of carcinoma, in conjunction with an extract of the corresponding tumour, to produce complement deviation. A series of observations made upon mouse carcinoma presents the advantage of being homogeneous in character, representing the result in different animals of the same type of pathological process, the same strain of tumour being employed throughout the series. On the other hand a similar series of observations

on human subjects affected with carcinoma necessarily represents a heterogeneous collection of individual data.

In mouse carcinoma I have been able to obtain complement deviation. A certain number of tumour mice do not, however, respond positively to a complement deviation test. Thus in a batch of nine mice recently inoculated with the same tumour, and examined at various stages of tumour growth, in three cases was complement deviation obtained. Nor are any indications so far available as to the conditions determining such deviation. Unfortunately the amount of serum obtainable from individual mice is too small to allow of an extended investigation of its properties to be made, the greater part of the serum being in fact required for testing for complement deviation. In these experiments it may be added that the same mouse tumour extract has been employed throughout; it has not been found practicable, nor does it appear desirable, as in the experiments next to be described, to prepare for each serum an extract of the corresponding tumour.

In the human subject I have not been able to obtain complement deviation in any of the cases of carcinoma examined. In all cases extract of the patient's tumour, removed by operation, was employed. In some experiments an extract of a tumour of the same type from another case was also used, but again with a negative result.

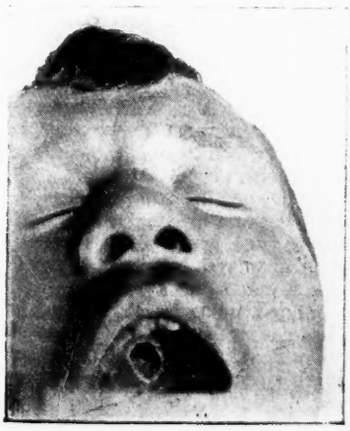
The specific cellular elements in cancer appear to be either cells proper to the individual affected or cells derived, at any rate in part, from another individual of the same species. In such cases any antisubstances produced in the blood plasma of the host would be of the nature of autocytotoxines or isocytotoxines, and it is in precisely these cases that evidence of the production of antisubstances is wanting or obtainable only as an exceptional event. The circumstance, however, that occasionally such antisubstances make their appearance (for example, autolysin in paroxysmal haemoglobinuria and in experimental blood destruction) lends support to the view, originally rejected, but now receiving some degree of consideration, that the production of autocytotoxines and allied antibodies may be in reality of common occurrence, though not directly demonstrable, under ordinary circumstances, yet incapable of indirect proof. The occurrence in certain cases of complement deviation in carcinoma is in itself of considerable interest, and appears to indicate that the production of autotoxines is in such cases in some way associated with the cancerous process. Beyond this point it is not at present possible to go.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

A CASE OF PEENASH.

PRIVATE G. C., South Lancashire Regiment, was admitted into the Station Hospital, Jubbulpore, C.P., in October, 1906. He complained of severe pains in the nasal cavity, chiefly referred to the posterior nares, a sense of discomfort, and at times severe pain in the frontal region. There was a muco-purulent discharge from the anterior nares, and the temperature was 102.4°. He had been on outpost duty ten days before, during the cold weather manœuvres between Jubbulpore and Saugor, and contracted a "cold" in the tent he was accustomed to sleep in.



He gave a distinct history of the actual morning of the attack. The progress of the case was unsatisfactory in the early stages; the pains increased, the temperature was of a remittent type, varying from 101.2° to 103°; the discharge extended to the posterior nares, and that from the anterior nares became sanious. The larynx was normal throughout. On the morning of the 19th a bulging was observed in the soft palate, which gradually increased, very painful from the beginning. A linear incision in the middle line, previously painted with a 10 per cent. solution of cocaine, was followed by a discharge of pus; the pus was offensive and loaded with maggots, which were afterwards confirmed as the larvae of the screw-worm, that of the fly *Lucilia hominivora* (Parel Laboratory, Bombay).

The progress of the case was slow. Inhalations of chloroform failed to destroy the larvae. Injections of equal parts of chloroform and water, and the oil of turpentine, were also used; the latter, in my opinion, is much more satisfactory, and eventually quite successful. The temperature rapidly fell, and there was no extension of inflammation into any of the neighbouring sinuses.

I am indebted to Lieutenant-Colonel Morris, officer commanding Station Hospital at Jubbulpore, for the photograph from which the illustration here given is reproduced.

J. GERALD BERNE,
Captain, R.A.M.C. (ret.).

Naples.

Reports

ON

MEDICAL AND SURGICAL PRACTICE IN THE HOSPITALS AND ASYLUMS OF THE BRITISH EMPIRE.

BRISTOL GENERAL HOSPITAL.

A CASE OF DISLOCATION OF THE LOWER CERVICAL SPINE.

(Reported by DAVID ROBERTSON, M.B., Ch.B., House-Surgeon.)

THE patient in the following case, a man aged 29, was admitted under the care of Mr. E. W. Hey Groves at 4 p.m. on August 2nd. The history given was that at about 6 p.m. on the previous day he was swinging in a swing-boat. He stood up and tried to catch the rope by which the boat was actuated, and, missing his hold, he fell forward out of the boat, his toes catching in the opposite seat. He landed on his right shoulder and hands, and somersaulted on to his back. On striking the ground he was conscious that "something in his neck cracked," and that he was paralysed from the neck downwards.

State on Admission.—There was paralysis of legs, abdominal and thoracic muscles; partial paralysis of the deltoids, abduction at the shoulder-joint being imperfect, and all the other arm movements were lost. Sensibility to touch, heat and cold, and pain was lost below the level of the second rib in front, and the spine of the scapula behind, and in the arms below the centre of the deltoid. Pupils were equal and narrowly contracted; they did not dilate in the shade. With regard to organic reflexes, he had incontinence of faeces and retention of urine. Respiration was jerky and diaphragmatic. On examination of tendon and muscle reflexes, knee-jerks and ankle-jerks were absent; cremasteric and abdominal reflexes also absent; delayed Babinski sign present on both sides. Triceps, supinator, and biceps jerks were present on both sides. There was no girdle sensation. He could rotate his head slightly without pain. Any marked movement caused pain in lower cervical region behind. Palpation of neck failed to reveal any projection. There was marked tenderness at the sixth cervical spine.

Progress.—By the morning of August 3rd he had total paralysis of the arms, and the arm jerks were absent on both sides. With the possibility of there being extradural or subdural haemorrhage, Mr. Groves operated in the afternoon, under chloroform. On removing the laminae of the fifth and sixth cervical vertebrae the dura mater at once bulged backwards. There was pulsation. On incising the dura mater a softened area of cord was apparent; no fracture of spine detected; fifth cervical vertebra thought to be abnormally mobile.

Result.—In the morning of August 4th he seemed to be in much the same condition as the previous day, but complained of pain in neck and tingling in the hands. Later had intense pain all over, requiring morphine. At 12.15 a.m. on August 5th he complained of shortness of breath; fifteen minutes later respirations ceased; the heart continued beating for eight to ten minutes.

At the autopsy the cord was found in a state of pulp from the fourth to sixth cervical segments. On removing the cord the posterior common ligament was seen to be ruptured between the fifth and sixth cervical bodies. The articular ligaments between these two vertebrae were completely torn. There was no fracture even of the articular processes. There had evidently been a dislocation between the fifth and sixth cervical vertebrae which had reduced itself; but meantime it had done sufficient damage to produce a myelitis which in its turn extended upwards to the phrenic centres, and caused death.

I am indebted to Mr. Groves for permission to publish the case, and also for the appended remarks.

REMARKS BY MR. HEY GROVES.

This case is of especial interest as illustrating the manner in which sudden dislocation of one cervical vertebra from another can occur so forcibly as to tear the posterior common ligament and pulp the cord without any fracture even of the articular processes. What is more remarkable still is the complete spontaneous reduction of the dislocation which had occurred without any manipulation. The lesion was so near to the fourth cervical segment that it is wonderful that death did not occur at once, but the fact that the deltoids were only partially paralysed at first and that the phrenic centres escaped destruction, shows that the cord was not functionally destroyed by the accident above the fifth cervical segment, although ascending myelitis soon brought about the fatal result.

Reports of Societies.

ROYAL SOCIETY OF MEDICINE.

MEDICAL SECTION.

Tuesday, October 25th, 1910.

J. MITCHELL BRUCE, M.D., F.R.C.P., President, in the Chair.

Multiple Cartilaginous Exostoses.

DR. GOSSAGE and MR. ROCK CARLING communicated a paper on the occurrence of multiple cartilaginous exostoses. It was, they said, rare, but was probably more frequent than was usually supposed, since the condition often gave rise to no discomfort. The tumours arose from the intermediate cartilage, and were generally first noticed during the first two years of life, but might be present at birth. They were very variable in size and number and usually required no treatment, but might cause discomfort by pressure on adjacent structures, when they should be removed. They had been supposed to be a consequence of rheumatism, syphilis, or rickets, but there was no real evidence in favour of any of these views. There was evidently some inherent abnormality of the intermediate cartilage which caused it to develop in an unusual manner, and this abnormality was very frequently hereditary. Evidence was adduced to show that the abnormality of the intermediate cartilage resulted not only in the production of bony tumours but also in alterations in the size and length of the bones. The inheritance seemed to obey Mendel's law—an affected person transmitting the abnormality to about half his children by a normal mate, there being no evidence of increased or diminished intensity during successive generations. Males were, however, affected about twice as often as females; but normal women in affected families not infrequently transmitted the abnormality to some of their children, while it was probable that normal males never did so. There were a considerable number of sporadic cases in which no history of any similar complaint amongst the relatives could be obtained; but it was possible that some of these did not arise *de novo*, but were really hereditary, the transmission having taken place through one or more normal females. The records of 51 families were dealt with. Of 30 families that were available for comparison, taking only the later generations of the offspring of affected individuals, 121 were abnormal and 130 normal. Professor BATESON thought it impossible to make a positive statement as to the type of heredity manifested by this disease. It, however, approached that of an ordinary Mendelian dominant. More examples of heredity in man were needed showing a sex limited inheritance like colour blindness. He thought the present disease was not such an example. Examples were further especially needed of sex-limited disease in which there was transmission to the females of the family. Dr. RUSSELL WELLS was by no means convinced that Mendelism applied to conditions of disease in the human subject. Mr. ROCK CARLING, in reply, said that in one of the new cases recorded in the paper death occurred from chondro-sarcoma of the rib.

SECTION OF DISEASES OF CHILDREN.

Friday, October 28th, 1910.

E. CAUTLEY, M.D., President, in the Chair.

Exhibition of Cases.

THE following were among the exhibits:—Mr. W. HAMPSON (for Dr. ERIC PRITCHARD): A case of *Achondroplasia* in a girl aged 5 years; the skiagrams showed defective ossification of the epiphyses of the long bones with overgrowth of the cartilages; the patellae were either absent or rudimentary. Dr. T. R. WHIPHAM: A heart presenting *Atresia of the pulmonary artery*, patent foramen ovale, and deficient interventricular septum; the right side was hypertrophied, and the left carotid artery arose from the innominate artery. The patient, aged 1 year and 9 months, was shown on May 27th, and presented marked cyanosis and clubbing of the digits. There was a polycythaemia of 12,740,000 red corpuscles per c.mm. and a haemoglobin value of 200 per cent. The only murmur heard was a faint systolic bruit over the pulmonary area. Dr. F. LANGMEAD: A case of *Scleroderma neonatorum with myositis fibrosa* in an infant aged 8 months. The face, trunk, and limbs were all affected, and the temperature showed a daily rise to from 99° to 100° F. Mr. P. L. MUMMERY: A girl aged 5½ years, with a tumour in the posterior aspect of the left rectus abdominis muscle, which had almost disappeared under potassium iodide. There were no other signs nor history of congenital syphilis. Dr. J. D. ROLLESTON: Charts and photographs of a case of *Gangrene of the leg* following diphtheria in a boy aged 13 years. No antitoxin had been given, and when seen on the seventeenth day the right leg below the knee was cold and anaesthetic. Dilatation of the heart and a temporary discoloration in both legs ensued. On the thirtieth day there was commencing gangrene of the left leg and obliteration of the pulse in the popliteal artery. Amputation through the knee-joint was subsequently performed, and recovery was uneventful. Dr. J. D. Rolleston also showed charts and photographs of *Concurrent scarlet fever and chicken-pox*. The boy, aged 8 years, had been exposed to chicken-pox three weeks previously, and was admitted with a typical scarlet fever throat and rash. On the following day the varicella eruption appeared. Subsequently there was a profuse desquamation, which confirmed the diagnosis of scarlet fever. The child made a good recovery. Dr. G. A. SUTHERLAND: A female child, aged 3½ years, the subject of *Recurrent tetany*. The attacks began seven months previously, after prolonged indigestion and abdominal distension. The tetany was typical, facial irritability being marked at times, and laryngeal stridor occasionally present. There were no signs of active rickets. Dr. J. B. MOLONY and Dr. H. D. ROLLESTON: A case of *Idiopathic dilatation of the colon*, with skiagrams. The patient, a male, aged 3 years, was weaned at the sixteenth month, and then had bouts of constipation with progressive abdominal distension. The bowels were very obstinate, and, in spite of a ravenous appetite, the child became emaciated. Bilious vomiting occurred from time to time, and peristalsis along the course of the colon was observed, but was unaccompanied by pain. Skiagrams taken after a bismuth meal showed an enormously distended bowel in the region of the ascending colon and a normal transverse portion, while a tube containing a soft wire passed into the anus indicated a distended rectum extending up to the diaphragm. Mr. C. T. DENT: a child, aged 4 months, with *Congenital elephantiasis* of the right arm, a condition allied to cystic hygroma. There was also a superficial naevus, or condition of cavernous angioma. The bones appeared normal in a skiagraph, but were probably longer than in the corresponding limb.

NORTH OF ENGLAND OBSTETRICAL AND GYNAECOLOGICAL SOCIETY.

Friday, October 21st, 1910.

Dr. W. K. Walls, President, in the Chair.

Meeting at Liverpool.

Drs. Leith Murray, Stenhouse Williams, and A. J. Wallace (Liverpool), read a paper on the incidence, characters, and significance of *Bacillus coli in the urine* of gynaecological patients, before and after operation. They found it present in 44.5 per cent. of normal urines examined before operation, and in 93 per cent. after operation. The type in every instance was the *B. coli verus* of MacConkey, but agglutinative differences were readily made out. There appeared to be no relation between post-operative temperatures and the presence of the bacillus. The suggestion was made that, in inflammatory conditions, the bacillus in question may, more often than is thought, be a secondary infection. Mr. R. Favell (Sheffield) reported a case of Caesarean section for *Concealed accidental haemorrhage*. The patient, a primigravida, aged 24, had been seized with acute abdominal pain and collapse on the day before admission. She was seven months pregnant. On admission she was very pale and collapsed; pulse rate 120; respirations 40; marked oedema of legs and face. The uterus was unduly enlarged, tense, and tender. The os was closed, and the cervix not taken up. There was a little vaginal bleeding. There was only a drachm of urine in the bladder, and that was loaded with albumen. Caesarean section was at once performed. The uterine wall was of a mottled purple colour. More than two pounds of blood clot was found in the uterus. The fetus, well developed for seven months, was dead. There was no *post-partum* haemorrhage. In spite of saline injections and other diuretic measures, anuria and uraemic coma ensued. Death occurred on the fourth day. Dr. T. B. Grimsdale (Liverpool) recounted a case of *Full-term ectopic pregnancy*, and showed the decomposing macerated fetus which he had removed from the abdominal cavity. The patient, aged 24, had borne one child, five years previously. There had been amenorrhoea for two years, and an abdominal swelling for a few months less. Fifteen months previously she had had slight abdominal pain for two days; this was not accompanied by vaginal bleeding. Afterwards the abdominal swelling seemed to get smaller. Eight months later pain again occurred for a short time. For a month before admission to hospital she had had constant abdominal pain, and had been getting thinner and experiencing night sweats. Consideration of the history and the physical condition led to a correct diagnosis. The sac was intraligamentous; it contained a quantity of offensive gas as well as the stinking fetus. The placenta was not seen. The sac was sutured to the abdominal wall, and packed with gauze. Four months elapsed before it was closed and the wound healed.

LIVERPOOL MEDICAL INSTITUTION.

Thursday, October 27th, 1910.

Dr. T. R. Bradshaw, President, in the Chair.

Mr. C. G. Lee showed a case of *Enlargement of the pituitary body* in a man aged 32, married for five years but without children. Four years ago he suffered from diabetes insipidus, his recovery being followed by a general weakness and marked increase of adipose tissue; his weight increased from 11 st. 7 lb. to 13 st. 10 lb. About two and a half years ago the vision began to fail. The patient though adipose showed no signs of acromegaly, and the viscera and blood pressure were normal. There was marked atrophy and the fields of vision were nearly obliterated save for small symmetrical areas on the nasal sides to twenty degrees. There was also loss of sexual power. Skiagraphy showed enlargement of the sella turcica. The exhibitor considered that the symptoms indicated a diminution of the function of the gland. Dr. Thomas Bushby read notes of a case in which *Multiple growths* had developed in the subcutaneous tissues associated with thyroid enlargement. The growths were extremely vascular, two of them having a distinct naevoid appearance on their summits. One of the smaller growths had been removed and the microscopic appearance favoured the view that they were metastases of an adrenal carcinoma. Dr. Ernest Glynn pointed out the resemblance of the tumour to fetal thyroid. The so-called hypernephromata were often derived from the kidney itself, not from the suprarenal rests. Mr. G. C. E. Simpson said that metastases from the thyroid gland might appear before signs of malignancy in the gland itself. Dr. Percy Marsh read a paper on *Pyloric stenosis in infancy* in five cases recently under his observation. He was of opinion that in every case, however severe the symptoms, medical methods should first be tried; if the infant did not show improvement, evidenced by diminution of the vomiting, by the condition of the stools, and by increase in the weight, the surgeon should be called in before the infant was so emaciated as to make any form of treatment almost, if not entirely, hopeless. Mr. Keith Monsarrat discussed the indications for operation as illustrated by one of Dr. Marsh's cases on which he had performed a posterior gastro enterostomy. The only satisfactory explanation of the lesion seemed to him hypertrophy resulting from over-action. The results of diet and lavage should be tested for a period of seven to ten days, and if the child was still losing weight an operation should be performed. Dr. Ernest Glynn thought the stenosis arose from pure muscular hypertrophy of the pylorus. Dr. Hubert Armstrong regarded the hypertrophy as a congenital malformation, and could not conceive how spasm in the feeble pylorus of the fetus or infant could possibly produce it. The malformation was one of excessive development, and therefore need not be expected to be associated with other congenital defects, which with few exceptions were those of arrest or deficiency. Mr. R. C. Dun agreed that medical treatment should first be given a trial. Rapid improvement usually resulted where the spasm was the predominant factor. If under medical treatment there was progressive loss of weight for several days, operation should be performed without delay. Cases which remained stationary under medical treatment should be operated on after three or four weeks.

BATH CLINICAL SOCIETY.

Friday, October 7th, 1910.

Mr. F. Lace, President, in the Chair.

Dr. A. J. B. Leckie showed a specimen of an *Ovarian fibroid* undergoing calcification and cystic degeneration removed from a woman aged 56. The tumour weighed 30 lb., the solid portion weighing 21 lb. He also showed a specimen of *Sarcoma of the left kidney* with the deposits by direct extension in the twelfth dorsal and first lumbar vertebrae, right kidney, and liver, weighing 4 lb. 10 oz., which had been removed from a child aged 4½ years after death, whose weight three weeks before she died was 21 lb. After the President had delivered a short introductory address, Dr. F. G. Thomson read a paper on a case of *Acute toxic polyneuritis* in a boy aged 19. The patient had suffered at the age of 5 years from an apparently similar attack of motor paralysis affecting all four limbs and ending in complete recovery after eighteen months. The last attack commenced five days after the patient had been thrown out of a sculling boat. Paralysis commenced in hands and feet, and within ten days of onset caused complete palsy of all four limbs and of both sides of the face. Muscles of neck, intercostals, and lumbar muscles were also extensively paralysed. Muscles of the eyes, tongue, pharynx, larynx, and the diaphragm were not affected. Sensory symptoms were confined to slight numbness of fingers and soles of feet and pain on pressure over neck and right pectoral region, the latter rapidly subsiding with rest. The sphincters were not affected. Deep reflexes were lost. Considerable wasting occurred in the scapular muscles and muscles of forearms and legs. Extensors of fingers and toes especially suffered. Recovery was slow but complete, all wasting eventually disappearing. Power was not completely restored till two years had elapsed from the onset. Since then there had been no weakness, and patient has been, and was now, able to take violent exercise and undergo prolonged fatigue without ill effects. Treatment consisted in rest, good diet, massage, galvanism, and faradism. Strychnine was given from time to time. Though such cases were usually

considered to be due to a toxic polyneuritis, it was difficult to understand how the toxin picked out the motor elements of a mixed nerve without affecting sensory fibres. It appeared more rational to assume that the anterior cornual cells were the primary site of the lesion. The relationship of these cases to Landry's paralysis was doubtful. Farquhar Buzzard had discussed the question fully in the Lumleian Lectures (1907), and came to the conclusion that the two types of paralysis were distinct, but the points of difference insisted on by Buzzard indicated rather a difference of degree than of kind. Dr. T. WILSON SMITH, dealing with *Intermittent albuminuria*, described a class of albuminuria due to effects of exposure to cold. In this class the albuminuria sometimes lasted for some days, after, for instance, injudicious cold bathing, even when there was no evidence of nephritis. In one case under his care a nervous elderly lady, who was given to recurring fears of her house being invaded by men, used to sit in her night-dress at the stairhead for hours in the night. This was followed by an albuminuria at first of merely temporary nature without nephritis, but gradually, as the habit was persisted in, evidences of chronic nephritis appeared.

Reviews.

IMMUNITY.

UNDER the title of *Studies in Immunity*,[1] Dr. BOLDUAN published in 1906 a translation of various articles which Professor EHRLICH and his followers have written on this subject. Now that a second edition of the volume has been called for, Dr. Bolduan takes the opportunity of adding some of Professor Ehrlich's most recent work. The most interesting of the new articles is the one on the "partial functions" of cells which formed the subject of Professor Ehrlich's Nobel lecture in December, 1908. "The time has come," he says, "for a further study of the minute chemistry of cell life; the concept *cell* must be resolved into a large number of distinct *partial functions*." As the activities of a cell are essentially chemical in nature, the search for these properties must be made by chemical methods. A good exemple of the chemically selective properties of cells is provided by Professor Ehrlich's work on trypanosomes. The three types of chemicals known to be poisonous for trypanosomes are (1) arsenical compounds, (2) fuchsin, and (3) trypan-red. He has found that it is possible, by systematic treatment, to produce strains of trypanosomes possessing immunity against these three poisons. The acquired immunity appears to be remarkably stable. Thus a strain of trypanosomes treated with arsenic, "after having been passed some 380 times through mice in the course of two and one-half years, still possesses the same drug immunity as the original strain." Another essential feature of the immunity to drugs is its strict specificity, which is manifested not merely towards a certain definite elementary combination, but against the entire chemical group of which this combination is a part. For example, the strain made immune against fuchsin is also immune against a large number of chemically related dyes, such as malachite green and ethyl green. It remains, however, susceptible to the other two types of poison, trypan-red and arsenical compounds. Similar specific resistances are exhibited by the trypan-red strain or by the arsenical strain. Researches such as these, it will readily be perceived, are not merely of theoretical interest. By deepening our insight into the nature of the action of drugs, they promise to be a valuable aid in the advancement of rational therapeutics.

The clinical aspects of immunity and serum-diagnosis are presented in a novel and interesting manner by Dr. WOLFF-EISNER.[2] The present volume has been written from the notes of lectures which he delivered to some practitioners in Berlin. The chief features of the book are a refreshing avoidance of newly coined technical terms, a clear statement of the classical experiments in the study of immunity, and a very clear but extremely dogmatic of his own rather heterodox views on many points. He has succeeded in developing a clear conception of his own point of view by totally ignoring any adverse evidence. This makes the book a very dangerous one for the uninitiated, but the clinician who has learnt the true value to be set upon theories of immunity will find the book both interesting and stimulating. Wolff-Eisner's leading conception is that all foreign albumens, all bacilli which depend on endotoxins for their poisonous properties, must first of all undergo some degree of decomposition before they can produce symptoms. He attaches great importance to von Pirquet's experiment, in which an animal was inoculated with vaccinia on successive days, with the result that all the inoculations matured on the same day. This seems to prove that the incubation period is a function of the host, and not due to multiplication of the parasite, as was formerly believed. He then takes up the thesis that the symptoms are due to lysis, and thus, paradoxical as it seems, to the first attempts at immunity. Thus in typhoid infections symptoms do not occur till bacteriolysins and bacteriotoxins produced by the host have liberated endotoxin from the bacilli. The production of immunity would thus seem to be a vain proceeding, but this is not so, for in the immune animal all the bacilli would perish before they had increased to such an extent that their destruction would liberate a dangerous quantity of toxin. This endotoxin doctrine is applied to the elucidation of many clinical phenomena. Thus the cutaneous and ophthalmic reactions in tuberculosis are said to be due to the presence of lysins in the blood of infected patients. Pregnancy toxaemias are due to the presence in the maternal blood, not merely of fetal albumen, but of a specific lysin which can liberate toxin from the albumen. The phenomena of serum disease are explained by assuming that the first injection leads to the formation of lysins which are necessary for the production of symptoms, hence there is an incubation period after the first injection. A second injection of foreign albumen, however, finds the lysins ready prepared, so that the albumen is immediately broken up and the endotoxin liberated, with the result that symptoms appear with alarming rapidity. Wolff-Eisner thinks that the anaphylactin of the French school is nothing more than the immune body or analogous lysin. In the case of hay fever the patient suffers because he is immune to the pollen albumen, can destroy it in his tissues, and liberate its endotoxin. In many cases of over-sensitiveness the author is compelled to assume the coexistence of individual predisposition to the liberated toxin. He draws attention to the fact that many of the phenomena are of vasomotor origin, and that symptoms are most likely to occur in the case of individuals with an unstable vasomotor system. He gives a clear account of Wright's doctrines in regard to opsonins and vaccine treatment. The endotoxin doctrine is not compatible with the giving of vaccines in acute infections, so he makes the suggestion that reliable evidence for the utility of vaccine treatment in acute infections can only be furnished when good results have been obtained in some uniform disease, such as typhoid fever. Interesting as these speculations are, it must be borne in mind that the evidence on which they are based is very slight, whilst the evidence produced by his opponents is not mentioned. From the strictly scientific point of view, this book should be condemned, but it must be admitted that it is extremely interesting.

[1] *Studies in Immunity*. By Professor Paul Ehrlich and his collaborators. Collected and translated by Dr. Charles Bolduan. Second edition. London: Chapman and Hall; New York: J. Wiley and Sons. 1910. (Medium 8vo, pp. 723; 6 dols.)

[2] *Klinische Immünitätslehre und Serodiagnostik: ein Lehrbuch für Aerzte*. By Dr. A. Wolff-Eisner. Jena: Gustav Fischer. 1910. (Roy. 8vo, pp. 186, 5 figures in the text.)

ULTRAMICROSCOPY IN RELATION TO MEDICINE.

GAIDUKOV has produced a very readable book on ultramicroscopy and dark-ground illumination in relation to medicine and biology.[3] The subjects of colloidal chemistry and optics have been excluded, and there is nothing in the

[3] *Dunkelfeldbeleuchtung und Ultramicroscopie in der Biologie und in der Medizin*. By N. Gaidukov. Jena: Gustav Fischer. 1910. (Sup. roy. 8vo; 76 pp., 13 figs. in the text and 5 plates, 2 in colours. M. 8.)

book which would be past the understanding of the average medical man. All forms of ultramicroscopical apparatus depend on the principle that no light reaches the eye of the observer except the rays which are reflected from the object under examination. This effect is achieved in a different manner in the different forms of apparatus. The author applies the designation of ultramicroscope to all of them. There is, first of all, the dark-ground condenser with a central stop, which has been replaced by the different forms of reflecting condenser. This is the instrument which has now come into general use for the detection of the *Spirochaeta pallida*. In the Siedentopf ultramicroscope the direct rays which are transmitted through the object are cut off *within the objective*. Against the great disadvantage of bad illumination this objective has one great advantage, in that it may be used for examination of thick preparations—hence for cytological studies. Finally, there is the Siedentopf-Zsigmondy ultramicroscope, which has been used largely for the examination of colloidal solutions. In this instrument light is admitted to the fluid in a direction at right angles to the long axis of the microscope. Following this short chapter on the various forms of apparatus there is a short chapter on Naegeli's theory of colloidal solutions, promulgated in 1861, but since confirmed in many particulars by ultramicroscopical investigations. Then follow some chapters on the results which have been obtained in many different fields. It is a very heterogeneous summary, but very interesting. The following are a few suggestive observations: It has been conclusively shown that the addition of various dyes, mordants, and fixatives to albuminous solutions completely alter their character, thus furnishing an important warning against placing implicit reliance on fine details of histological structure obtained by elaborate technique. Numerous searches have been made for ultramicroscopical parasites, but the results are disappointing, as nothing definite has been obtained. The examination of milk shows, according to Lemanissier, that the supramicrons of casein in human milk are smaller than in cow's milk, and that they are larger in boiled milk than in raw milk, furnishing another explanation to the perennial problem: Why does not modified milk always suit the human child? Perhaps, as a warning against attaching too much importance to these pioneer observations, we may note that from the examination of a commercial solution of chlorophyll Raehlmann has been able to explain the colours of flowering plants, autumnal tints, and many phenomena of chromatic adaptation. No less an authority than von Behring has registered his opinion that for the detection and identification of albumens in the urine the ultramicroscope will soon play a part quite as important as does the polariscope in the case of urinary sugars. In bacteriology there can be little doubt but that the dark-ground condenser has come to stay, if for nothing more than the detection of the *Spirochaeta pallida* or of flagella. The author's own researches have been mostly confined to botany, and are illustrated by some very beautiful plates, many of which are from actual photographs. As he modestly confesses, his conclusions require confirmation by an acknowledged expert. A commercial application of the method to the examination of fibre used in weaving is not the least interesting. The more homogeneous or optically void a fibre is the better are its properties, both from the mechanical and artistic points of view. The book is not an important contribution to our knowledge, but an interesting exposition of the possibilities of a new method.

NEURASTHENIC TOXAEMIA.

Neurasthenia is one of those prevalent present day disorders about which much has been written but about which little is with any degree of certainty known. Being, so far as is yet ascertained, a functional malady, pathology has given little help in the elucidation of the fundamental conditions upon which it depends; but, on the other hand, speculation has been stimulated to suggest all sorts of hypotheses which might be reasonably accepted as working theories upon which to establish a reasonable explanation of the multifarious manifestations by which the neurasthenic condition declares itself and has come to be recognized. Not the least fascinating of these many theories is that which attributes the condition to some form or forms of blood poisoning, which by a process of slow tissue intoxication ultimately reaches the nervous system, or by some unexplained power of selection attacks it primarily.

Dr. Maurice Page of Bellevue is the latest authority in support of this view, and his book, *La toxémie neurasthénique*,[4] recently issued by Messrs. Vigot Frères of Paris, is a comprehensive analysis of a long succession of cases, from which he endeavours to demonstrate, by careful investigations of blood, urine, stools, stomach contents, etc., that in the majority of instances neurasthenic patients are physically as well as psychically ill, and that it is necessary for their cure to treat them on antitoxic principles.

In the short and sketchy summary given of the symptomatology of neurasthenia we are surprised to note that the author makes no mention of the curious contradiction which so often exists between the reflex of the knee and that of the sole of the foot; he further gives a very inadequate description of the type of knee-jerk which is characteristic of the condition. It is not in accordance with generally accepted opinions to be told that the conviction which admits "traumatism as a sufficient cause of neurasthenia" must be abandoned. Further, although the close association frequently found to exist between neurasthenic states and certain arthritic manifestations is familiar, we are not quite prepared to admit unreservedly that "it is the predisposition to neurasthenia which creates an arthritic heredity," or that the time is yet arrived when we are justified in classifying neurasthenia as an "affection para-arthritique."

On the other hand, we fully agree with Dr. Maurice Page that digestive troubles are undoubtedly at the root of many neurasthenic conditions, and so far as it is true that some arthritic conditions are dependent upon gastric disturbance we recognize that in one line of etiological incidence arthritis and neurasthenia are brought into close intimacy. He sums up the results of his investigations by saying:

> Tous les neurasthéniques sont donc des intoxiqués; ils le sont par leur estomac, par leur intestin, leur foie, leur coeur, leur reins; ils le sont très vite parcequ'ils ne neutralisent plus ces poisons, qui bientôt viendront empoisonner leurs cellules cérébrales.

And with this general statement most observers who have an extended experience of neurasthenia will be in accord. The pathology of the condition is still obscure, but there is much to suggest the likelihood of its dependence, in many instances, upon a disturbed metabolism the result of toxaemic absorption.

PREVENTABLE DISEASES.

The first portion of Dr. Woods Hutchinson's interesting volume[5] is given to a consideration of the natural defences of the body against illness, the power of heredity as a preventive factor, and the physiognomy of disease. The chapter devoted to the last-named subject, or "what a doctor can tell from appearances," deserves to be read by every man engaged in the active pursuit of medicine. The author does not attempt to minimize the value of instruments of precision as helps to diagnosis, nor does he undervalue the triumphs of the bacteriologist and the chemist, but he wisely insists that, "priceless and indispensable as are these laboratory methods of investigation, they should not be allowed to make us too scornful and neglectful of the evidence gained by the direct use of our five senses." In this chapter he indicates to what excellent use these special senses may be put by those who know how to avail themselves of Nature's endowments. Among the remarks

[4] *La toxémie neurasthénique: Les neurasthénies sont des intoxications.* Par Dr. Maurice Page, Médecin Directeur de l'Institut Médical de Bellevue. With a preface by Dr. F. Helme. Paris: Vigot Frères. 1910. (Cr. 8vo, pp. 256. Fr. 3 50.)

[5] *Preventable Diseases.* By Woods Hutchinson, A.M., M.D., Clinical Professor of Medicine, New York Polyclinic. London: Constable and Co.; Boston and New York: Houghton Mifflin Co. 1909. (Post 8vo, pp. 448. 6s.)

on various preventable diseases discussed in this volume, those on appendicitis are perhaps worthy of specially careful reading. Most of us will agree with the author that appendicitis is a very real, and sometimes a very dangerous, disorder; but the agreement of many will be still more complete when they find him add: "There has come, first of all, a state of mind almost approaching panic in regard to it; and, secondly, a preference for it as a diagnosis, as so much more *distingué* than such plebeian names as 'colic,' 'indigestion,' 'enteritis,' or the plain old Saxon 'belly ache,' which has reached almost the proportions of a fad." It may be comforting to those who are possessed of a terror of this disease to be reminded by Dr. Hutchinson that, under natural conditions, the lumen of the appendix becomes gradually contracted, until by the forty-fifth year of age about 50 per cent., and by the sixty-fifth year nearly 70 per cent., of all appendices are cut off entirely from the cavity of the caecum. In passing it may be noted that in the discussion of malaria there is a curious omission of the name of Sir Patrick Manson, who has done so much towards bringing this tropical scourge within the realm of preventive disease. The book is pleasantly written throughout, and, though no attempt is made to enter into details of treatment, such a good etiological survey is given of each of the ailments brought under review that the general lines of management, where not actually set forth, follow as a natural corollary. The author establishes these preventable diseases in their proper economic and sociological settings, and helps us to recognize in the fullest measure the value of preventive medicine, while also indicating the pathway which we must tread in order to gain complete control of many prevalent present-day disorders. The book has a full and carefully arranged index.

MALIGNANT GROWTHS.

Now that the investigation of malignant disease has entered on the experimental phase, there is some danger lest the histological examination of malignant tissues may fall into disrepute as an old-fashioned study from which there is little to learn. As a corrective against this tendency Professor Hansemann's atlas of malignant tumours[6] will serve a useful purpose. Whatever may be the value of transplantation experiments with mouse cancer, it remains as true to-day as it was before the carcinomata of mice came into notoriety that the best available treatment for malignant disease is early excision, and that the decision as to the necessity for surgical intervention depends to an important extent on the accuracy of histological diagnosis. Professor Hansemann's *Atlas* does not deal with theoretical or controversial questions, but is intended to serve as a practical guide to students and practitioners desirous of learning how to diagnose malignant disease under the microscope. The fifty-three pages of practical instructions in technique and diagnosis are excellent. The author gives sound advice on the significance of abnormal types of nuclear mitosis. There is no pathological form of nuclear division which in itself is characteristic of malignancy; even asymmetric figures may, though perhaps not frequently, be found under other conditions. But the occurrence of numerous mitoses of irregular type is important evidence in favour of malignancy, because experience teaches us that they occur much more frequently in malignant than in innocent tumours. Another important point to which Professor Hansemann calls attention is that the tissue in the neighbourhood of a carcinoma frequently undergoes a non-malignant proliferation of an adenomatous or a polypous type. It is particularly desirable to bear this fact in mind when making a diagnosis of such material as curettings from a uterus, since non-malignant hyperplasia may be present side by side with true cancer, and the latter may be missed unless carefully searched for. In speaking of fixatives, Professor Hansemann expresses a strongly unfavourable opinion of formalin, which, he says, gives a bad definition, does not fix the nuclear substance properly, and causes confusion by the production of artefacts. We are surprised at this view. Formalin possesses the merit of rapid penetration, and when its used is combined with or followed by Müller's fluid, many histologists find that it gives excellent results. The special feature of the volume is the collection of twenty-seven full-page plates representing various types of malignant disease. The illustrations are reproductions of specimens stained with haematoxylin and eosin; they have been specially selected with a view to bringing out diagnostic features and will prove a valuable aid to the work of the clinical laboratory.

[6] *Atlas der bösartigen Geschwülste.* Von Professor Dr. D. v. Hansemann. Berlin: August Hirschwald. 1910. (Cr. 4 to, pp. 61, Tab. 27. M. 9.)

BIOLOGY FOR INDIAN STUDENTS.

To meet the requirements of students in India Dr. R. E. Lloyd, I.M.S., has undertaken the task of writing a new *Introduction to Biology.*[7] This is the first time such an attempt has been made, and it is certainly not without justification. All the English elementary textbooks naturally deal with British types, and the student has descriptions of the animals which he is actually studying and dissecting. In India the fauna is different from that of this country, and the student using an English textbook labours under the disadvantage of having to read descriptions of animals allied to, yet different from, those which he is dissecting. Such a discrepancy, intrinsically of no great moment, is apt to prove somewhat disconcerting to beginner. On this account, if for no other reason, Dr. Lloyd's book is well worth recommendation. It is, at the same time, well written and readable. Strictly speaking, it ought properly to be titled "An Introduction to Zoology," for it deals only with animal types, and indeed is confined to invertebrates. The types chosen appear to be suitable, and the method of treatment satisfactory in the main. The difficulties in most cases are intelligently explained, but in some instances—for example, in karyokinesis—the author does not seem to have gained much by his illustration. Reference to debatable points, with which it is unnecessary to cumber student's minds, is met with more frequently than is desirable. Two of the longest chapters are devoted to Protozoa and Insecta, and as the book is intended chiefly for medical students, we could have wished them even fuller. The plates illustrating the dissections could have been much improved upon, as the drawings are all rather small. The last four chapters deal with evolution, heredity, and kindred subjects. They are by no means the least interesting section of the book, but they seem, in parts at any rate, to be quite beyond the scope of students who have only studied the forms described in the preceding chapters. The geological history of the horse, for instance, reproduced from Huxley, is of undoubted interest, but its significance can hardly fail to be lost to a student who has not acquired some knowledge of vertebrate osteology. The difficulty, however, of deciding whether or not to introduce these subjects is recognized by the author, and if they demand rather more knowledge than that possessed by an elementary student, they may serve to stimulate the desire to obtain that knowledge.

[7] *An Introduction to Biology for Students in India.* By R. E. Lloyd M B., D Sc. London: Longmans, Green and Co. 1910.

NOTES ON BOOKS.

The new volume of *Reports from the Clinical and Research Laboratories of St. George's Hospital,*[8] consists mainly of articles which have already appeared in various medical journals. The excretion of creatinin in diseases involving the muscles forms the subject of two articles by Dr. Spriggs; they are followed by an account of Dr. Longridge's investigation on the excretion of this substance by lying-in women. Mr. Bayly writes on the diagnosis of syphilis by recently discovered laboratory methods, one of which depends on recognition of the specific organism by means of the ultra-microscope. This method is well known to syphilologists in Paris, and, in Mr. Bayly's opinion, deserves wider recognition on this side of the Channel. "Without doubt," he says, "this method is the most practical and certain now available for ascertaining whether a lesion of the skin or mucous membrane

[8] *Reports from the Clinical and Research Laboratories of St. George's Hospital, London.* London: John Bale, Sons, and Danielsson, Limited. 1910. (Medium 8vo, pp. 208. 5s. net.)

is syphilitic or not." We shall be interested to see if Mr. Bayly can convince other authorities in this country that the *Spirochaeta pallida* may be distinguished with certainty from other spirochaetes by means of the ultra-microscope. Dr. Hunt examines the statements, recently put forward by some observers, that the tubercle bacillus is of common occurrence in the circulating blood of tuberculous patients, and that microscopical examination of the blood is a valuable aid to diagnosis. His conclusion is that a diagnosis of tuberculosis in supposed early cases of the disease in man, and in cases where tubercle bacilli are not demonstrable by other methods, cannot usually be established by microscopic search for bacilli in specimens of the blood. The volume as a whole is a good record of useful work in clinical pathology.

These are halcyon days for the lover of good literature who happens to be afflicted with a short purse. It is now possible to obtain a charming miniature copy of that masterpiece of nonsense, *The Hunting of the Snark*,[9] for the modest sum of one shilling. For the benefit of those, if such there be, who do not know the book, we quote the following specimen of its peculiar humour. It is said of the Barrister that—

He dreamed that he stood in a shadowy Court,
Where the Snark, with a glass in its eye,
Dressed in gown, bands, and wig, was defending a pig
On a charge of deserting its sty.

The Witnesses proved, without error or flaw,
That the sty was deserted when found:
And the Judge kept explaining the state of the law
In a soft under-current of sound.

The indictment had never been clearly expressed,
And it seemed that the Snark had begun,
And had spoken three hours, before any one guessed
What the pig was supposed to have done.

The Jury had each formed a different view
(Long before the indictment was read),
And they all spoke at once, so that none of them knew
One word that the others had said.

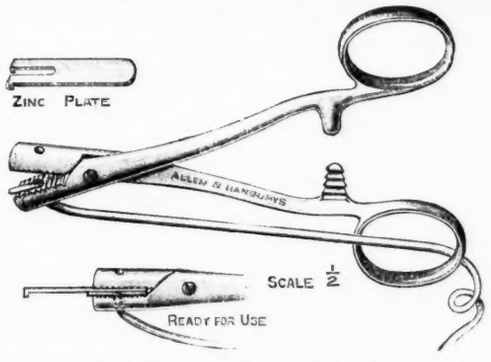
This latest edition of *The Hunting of the Snark* is identically the same as the former large one, is beautifully bound and printed, and best of all, contains all Henry Holiday's illustrations.

[9] *The Hunting of the Snark*; An Agony in Eight Fits. By Lewis Carroll. With nine illustrations by Henry Holiday. Published by Macmillan and Co., Limited, St. Martin's Street, London. 1910. Price 1s. net. Pp. 83.

MEDICAL AND SURGICAL APPLIANCES.

A New Clamp for Use with Plate Electrodes.

In a paper read before the West Somerset Branch of the British Medical Association, Dr. Alfred J. H. Iles (Taunton) gave an account of a new clamp for use with plate electrodes. The following is his description: I have also for your inspection an electrode clamp, which I have found most useful in the treatment of piles by zinc-mercury ions. For this I take a piece of sheet zinc and cut the electrode



to fit the case, but Messrs. Allen and Hanburys, who made the clamp from my pattern, are now cutting electrodes for use with it. In the treatment of piles I use a zinc plate about 2 in. long and ⅜ in. wide, with a slit about ½ in. long and ⅛ in. wide, cut out at the distal end, thus forming two prongs, the tips of which are bent at right angles into hooks. The object of these hooks is to hold the electrode in the position in which it is first placed, thus ensuring the full reaction taking place all over the area treated, and that of the slit to allow of a view of a portion of the pile under treatment, thus giving the operator his colour index. This zinc electrode I amalgamate with metallic mercury, while local anaesthesia is being obtained by means of tampons soaked in cocaine solution. To obtain a direct contact, I bare the end of the conductor from the positive pole and pass it through the hole drilled slantways through one blade of the clamp. The zinc mercury electrode is then placed in position and the clamp closed, firmly pressing the copper wire against the zinc. The patient now being ready and the piles having been well strained down, the electrode is applied to the part to be treated and the operation carried out in the usual manner. I have found this method very useful also in treating ulcers which are in positions difficult to reach with saturated tampons.

BRITISH MEDICAL BENEVOLENT FUND.

At the October meeting of the Committee 27 cases were considered, and grants amounting to £209 made to 23 of the applicants, 1 case being passed over, and 3 postponed for further inquiry. Appended is an abstract of the cases relieved:

1. Widow, aged 32, of L.R.C.P., L.R.C.S.Edin. Since husband's death six years ago has supported herself by nursing and letting lodgings, and now asks for assistance towards the education of her two children, aged 12 and 8. Voted £12.

2. Widow, aged 50, of M.R.C.S. Has been incapacitated for some months, owing to an accident, and is dependent on a daughter, whose earnings are small. Voted £5.

3. Daughter, aged 68, of late M.R.C.S., L.S.A. No income. Is given a home in return for services, but receives no salary. Suffers from increasing deafness and general ill-health. Voted £12.

4. Widow, aged 47, of L.K.Q.C.P.I. Since her husband's death has maintained herself by letting lodgings and sewing, but, owing to a recent illness, is obliged to ask for a little help. Voted £5.

5. Widow, aged 34, of M.D.Glasg. Is quite destitute through recent death of husband and requires assistance whilst seeking suitable work. Voted £10.

6. L.S.A., aged 65. Broke down in health after the death of his wife at the end of a two years' illness, and has consequently lost most of his practice and been obliged to leave his house owing to arrears of rent. Is given temporary shelter by an old patient, and hopes to make a fresh start. Voted £10.

7. Daughter, aged 39, of late F.R.C.S. Has recently undergone an operation for tuberculous disease of a large joint and is practically incapacitated. Relieved four times, £48. Voted £12.

8. Daughter, aged 40, of late L.R.C.P., L.R.C.S.Edin. Endeavours to support herself by nursing, but finds considerable difficulty in obtaining cases. Relieved six times, £50. Voted £6.

9. Daughter, aged 54, of late M.R.C.S., L.S.A. No income, and almost incapacitated by ill-health. Relieved eight times, £73. Voted £12.

10. Daughter, aged 61, of late M.R.C.S. Receives a small weekly allowance from two friends, but is unable to earn anything owing to permanent ill health. Relieved six times, £66. Voted £12.

11. Daughter, aged 57, of late M.R.C.S. No income; supports herself by letting rooms and knitting. Health delicate. Relieved six times, £72. Voted £12.

12. Widow, aged 43, of L.R.C.P., L.R.C.S.Irel. Since husband's death has endeavoured to support herself by taking paying guests, but has had her furniture seized for rent, and now contemplates emigration to Canada. Four daughters, but none able to help, and two dependent. Relieved once, £10. Voted £2, and application to be further considered next month.

13. Daughter, aged 47, of late M.D.Edin. Is a daily governess, but at present has no post. Relieved twice, £10. Voted £5.

14. M.D.Aber., aged 58. Quite incapacitated by lateral sclerosis, and dependent on pensions from charitable institutions. Two children, aged 12 and 6. Relieved twice, £28. Voted £5.

15. Widow, aged 63, of L.R.C.P., L.R.C.S.Edin. Only income a small pension from a City company, and unable to follow any occupation on account of severe chronic rheumatism. Relieved twice, £16. Voted £10.

16. Widow, aged 43, of L.R.C.P.Edin., M.R.C.S.Eng. Supplements the help given by a stepson only earning a small salary by letting lodgings. Relieved twice, £24. Voted £12.

17. Widow, aged 70, of M.D.St. Andrews. No income, and family only able to give slight help. Voted £12.

18. Daughter, aged 55, of late M.R.C.S. Mentally unfit to follow any occupation, and apart from a little help from a brother, is dependent on three half-sisters, who all have to earn their living. Relieved six times, £61. Voted £5.

19. Widow, aged 70, of M.R.C.S. Dependent on an old age pension and a daughter who is a governess. Relieved five times, £62. Voted 12.

20. Widow, aged 43, of M.R.C.S., who for many years held a teaching post at a medical school. Endeavours to support herself by letting lodgings. Three children, all at institutions. Relieved once, £15. Voted £10.

21. Wife, aged 61, of L.F.P.S.Glasg., who has been in bad health for three or four years, but has just obtained a ship's surgeoncy. Applicant lets lodgings, but cannot make sufficient for maintenance. Relieved once, £12. Voted £1 and case to be considered again after further inquiry.

22. Daughter, aged 75, of late M.R.C.S., who was a surgeon in the Scots Guards. Was well provided for, but lost most of her capital through the defalcations of the family solicitor and the rest through unfortunate investments. Now dependent on an old age pension, with occasional help from relations. Relieved once, £18. Voted £15.

24. Widow, aged 56, of L.S.A. No income, and dependent on a son earning a small weekly wage. Relieved nine times, £102. Voted £12.

SEVENTEENTH INTERNATIONAL CONGRESS OF MEDICINE.

A MEETING of the Organizing Committee was held on October 28th, at 5 p.m. in the Royal College of Physicians, the PRESIDENT in the chair.

Letters of regret were received from the following: Dr. T. Dyke Acland, Professor H. G. Barling, Sir James Barr, Dr. Barrs, Mr. George A. Berry, F.R.C.S.Ed., Dr. J. Mitchell Bruce, Sir John Byers, Dr. P. J. Cremen, Sir Halliday Croom, Dr. H. Davy, Professor D. W. Finlay, Dr. J. Magee Finny, Sir Thomas R. Fraser, Dr. Edwin Goodall (Cardiff), Mr. J. W. B. Hodsdon, Professor James Little, Professor H. Littlejohn, Sir Donald MacAlister, Professor Dixon Mann, Professor Howard Marsh, Sir Isambard Owen, Dr. R. W. Philip, Sir G. H. Philipson, Sir Richard Douglas Powell, Mr. J. Scott Riddell, Mr. A. W. Mayo Robson, Dr. F. M. Sandwith, Professor R. Saundby, Professor T. Sinclair, Sir Wm. Smyly, Professor E. H. Starling, Dr. StClair Thomson, Professor W. Thorburn, and Dr. Norman Walker.

The PRESIDENT pointed out that the list of the Organizing Committee was originally drawn up with a view to territorial representation only. At the meeting of the General Committee on October 12th a wish was expressed, and partially carried out, that it should represent also departments of practice. In order to fulfil this wish, the following additional members were nominated for election: Miss Aldrich-Blake, Dr. F. W. Andrewes, Dr. J. B. Ball, Dr. Lazarus-Barlow, Dr. J. S. Barr, Dr. E. F. Bashford, Dr. A. E. Boycott, Dr. H. G. Brooke, Dr. W. Bulloch, Mr. Arthur Cheatle, Miss Cock, Mr. Treacher Collins, Mr. A. E. Cumberbatch, Sir William Dalby, Professor George Dean, Professor A. F. Dixon, Dr. Dudgeon, Dr. Colcott Fox, Dr. Galloway, Dr. Garrod, Dr. Albert Gray, Dr. Dundas Grant, Professor Greenfield, Dr. de Havilland Hall, Dr. E. Hobhouse, Mr. W. H. H. Jessop, Mr. Robert Jones, Mr. Reginald Jowers, Mr. Lambert Lack, Mr. Richard Lake, Dr. Edward Law, Mr. J. B. Lawford, Lieutenant-Colonel Sir W. B. Leishman, Mr. H. Littlewood, Professor Alexander Macalister, Dr. P. McBride, Sir John McFadyean, Dr. C. J. Martin, Dr. William Milligan, Dr. F. W. Mott, Dr. D. R. Paterson, Dr. F. M. Pope, Dr. J. J. Pringle, Dr. Urban Pritchard, Professor Arthur Robinson, Mrs. Scharlieb, Mr. S. G. Shattock, Professor Sherrington, Professor Lorrain Smith, Mr. Priestley Smith, Dr. G. F. Still, Dr. G. A. Sutherland, Mr. H. H. Taylor, Professor Peter Thompson, Professor W. H. Thompson, Dr. StClair Thomson, Miss Thorne, Dr. Herbert Tilley, Miss Jane Walker, Dr. Watson Williams, Professor Sims Woodhead, and Sir Almroth Wright, and these were unanimously elected, with power to add to their number.

Executive Committee.

The PRESIDENT then nominated the following for election as members of the Executive Committee: Sir A. Pearce Gould (Chairman), Sir Clifford Allbutt, Sir William Allchin, Mr. A. A. Bowlby, Sir Francis Champneys, Sir William Church, Dr. Bertrand Dawson, Mr. Clinton Dent, Mr. R. J. Godlee, Dr. Norman Moore, Sir Malcolm Morris, Professor Osler, Dr. Pavy, Sir R. Douglas Powell, Mr. D'Arcy Power, Sir Felix Semon, Mr. Charters Symonds, Dr. Hale White, the Chairman of the Finance Committee, the Chairman of the Reception Committee, the Chairman of the Council of the British Medical Association, a member to be nominated by the Faculty of Medicine of each of the Universities, excluding Oxford and Cambridge (which are already represented), namely: *England*—Universities of Birmingham, Bristol, Durham, Leeds, Liverpool, Manchester, and Sheffield. *Scotland*—Universities of Aberdeen, Edinburgh, Glasgow, and St. Andrews. *Ireland*—University of Belfast, Trinity College, Dublin, and the National University of Ireland. *Wales*—University College, Cardiff.

Sir A. PEARCE GOULD proposed, and Mr. D'ARCY POWER seconded, the addition of Mrs. Scharlieb to this committee. These members were unanimously elected, with power to add to their number.

Finance Committee.

The PRESIDENT then stated that Sir Dyce Duckworth had consented to act as the second Treasurer with Mr. Makins, and he then nominated the following as members of the Finance Committee: Sir Henry Morris (Chairman), Dr. Herbert Spencer, Dr. Frederick Taylor, Sir Edgcombe Venning, and Mr. E. Francis White (Putney). These were unanimously elected, with power to add to their number.

Reception Committee.

The PRESIDENT then nominated the following for election to the Reception Committee: Sir T. Lauder Brunton (Chairman), Mr. A. E. Barker, Sir William H. Bennett, Sir Havelock Charles, Sir Anderson Critchett, Sir Thomas Boor Crosby, Mr. Edmund Owen, Dr. Pasteur, Dr. StClair Thomson, Dr. Samuel West, and Dr. Theodore Williams, with power to add to their number.

Ex officio Members.

The permanent officers of the Congress are *ex-officio* members of all committees.

Work of Committees.

The PRESIDENT then said a few words on the organization of the various committees.

The Executive Committee was intended:

(*a*) To manage local matters;
(*b*) To act as a board of advisers to the President;
(*c*) To receive and consider reports from the Finance Committee, the Reception Committee, and the various sectional committees when appointed.

It was to be understood that, when the business of a section or sections was to be discussed, the president of such section or sections would be summoned to the meeting of the Executive Committee. It might be necessary, in view of any general regulations being drawn up, that all presidents of sections should be so summoned.

The Organizing Committee was intended to act:

(*a*) When summoned as a whole, as the ultimate committee of reference and of election to appointments of presidents, vice-presidents, secretaries, and councils of sectional committees;
(*b*) To be the source from which special committees could be drawn, if necessary, to advise and report on matters pertaining to the organization of the several sections.

The Organizing Committee then adjourned.

MEDICO-PSYCHOLOGICAL ASSOCIATION.

NORTHERN AND MIDLAND DIVISION.

THE autumn meeting of the Northern and Midland Division of the Medico-Psychological Association was held, at the kind invitation of Dr. C. L. Hopkins, at the City Asylum, Fulford, York, on Thursday, October 20th. Dr. HOPKINS presided.

Hereditary Syphilis and General Paralysis.

Dr. MIDDLEMASS read a paper on hereditary syphilis and general paralysis. He began by apologizing for bringing forward so well-worn a subject. The idea occurred to him some time ago that in cases of general paralysis where no history of personal syphilis could be obtained, an explanation might be found in hereditary syphilis as a cause. Probably most people were of opinion that developmental or juvenile general paralysis was due to inherited syphilis, and in the great majority of the cases he had seen there was a clear history pointing in this direction. In one such case reported the Wassermann reaction had been found to be positive. He went on to suggest that in cases where there was no history of acquired syphilis, a positive Wassermann reaction might point to hereditary syphilis and not to the untruthfulness of the patient.

In the discussion which followed Dr. HOPKINS referred to the use of the Ross Jones test. Dr. TREVELYAN spoke of the relation of tabes to syphilis in families, and mentioned an interesting case. Dr. HITCHCOCK considered that general paralysis depended on the temperament of the individual as well as on acquired or hereditary syphilis.

International Congress on Psychiatry.

Dr. BEDFORD PIERCE gave a most interesting account of his visit to the International Congress on Psychiatry held

in Berlin from October 3rd to 7th, 1910. After giving a brief sketch of the arrangements made for the holding of the Congress and the cordial reception extended to the visitors, he briefly outlined the various items that were brought before the congress, amongst which may be mentioned papers on Asylum Planning, Work as a Therapeutic Agent, The Boarding Out of the Insane—illustrated with lantern views of its working in Hungary—The Significance of the Wassermann Reaction, Mental Diseases in the Army and Navy, Sleeping Sickness. Perhaps the most interesting features of the Congress were an exhibition of models of various asylums in South Germany; cinematograph films showing the movements of the insane, and an excellent cinematograph exhibition of micro-organisms, showing in a most striking way their movements, particularly in relation to the red blood corpuscles. Amongst those exhibited in active movement were *Spirochaeta pallida*, and various spirilla and trypanosomes.

Dr. McDowall thought that some demonstrations similar to those given in Berlin would be very instructive if arranged at one of the general meetings of the association in London.

LITERARY NOTES.

We think the following bulletin, which we reprint from the *Times*, may be of interest. It relates to an illness of George III:

Wednesday, October 31.

"Oct. 29, 1810.

"The King has been indisposed for a few days past; His Majesty has had fever, and his nights have been restless; but he has had several hours' sleep this morning.

"Henry Halford,
"W. Heberden,
"M. Baillie."

"October 30, 1810.
10 o'clock, a.m.

"The King has passed a restless night, and His Majesty is much the same to-day as yesterday.

"Henry Halford.
"M. Baillie,
"W. Heberden."

"An express was sent off from Windsor on Saturday night, at ten o'clock, for Dr. Heberden to attend the King, and he arrived at Windsor at five o'clock on Sunday morning. Everything is kept remarkably quiet in Windsor Castle; not the least noise is suffered."

The next bulletin is as follows:

"The last official account of the melancholy state of his Majesty's health was received in London at about 3 o'clock yesterday, and is as follows:

"Windsor Castle, Oct. 31, 1810.
Nine o'clock, a.m.

"The King has passed a restless night, but his Majesty's fever is not increased.

"Henry Halford.
"W. Heberden.
"M. Baillie."

It may be mentioned that on October 29th the King was found incapable of transacting business, owing to derangement of mind. He was placed under the charge of the Queen, and on her death in 1818 the care of him was transferred to the Duke of York. He died on January 29th, 1820.

National Health, edited by Mr. Ernest Schofield, is the official organ of the Women's Imperial Health Association. The October number contains an article on the disinfection of schools in relation to public health by Mr. J. Arthur Coroley, Clerk to the Northwich Urban District Council, with a number of editorial articles dealing with numerous subjects of practical hygienic interest. *National Health* gives much information on matters concerning health, and, as far as we can judge from the number before us, the faddist has no place in it.

"To see oursels as others see us" in nine cases out of ten would prove an unpleasantly illuminating experience, but occasionally the reverse happens, and it is unexpectedly welcome. Admiration and approval are always pleasant, and it is, therefore, distinctly gratifying to know that a national institution such as the English public school system has found favour in the eyes of other nations besides our own. Old Harrovians, in particular, should take a special pleasure in the perusal of the October number of *L'Hygiène*, since it contains a most sympathetic and appreciative account of "un grand 'public school' anglais; Harrow College." M. Morgan has evidently taken endless pains in the study of his subject. He writes with enthusiasm of the free and healthy life led by the boys, the self-reliance and manliness engendered by the total absence of surveillance, and even has a good word to say for "cette vieille institution du faggisme." It is only fair to add, however, that his admiration of Harrow as a typical English public school does not blind him to the fact that the education, or rather the actual amount of knowledge acquired there, is far below that given by the French colleges and lycées; and he justly observes that, in spite of many brilliant exceptions, the majority of English school boys are more ignorant than their contemporaries across the Channel, precisely because they have so much more freedom and opportunity to shirk the boredom of study. Notwithstanding this it is interesting to find a suggestion from Dr. Maurice de Fleury in his article on "Hygiène et la vie," to the effect that a modification of the present system of education in France is urgently needed, whilst he hints that the excessive care displayed by present day teachers in the development of the judgement and individuality in preference to the memory of their pupils, cannot fail to have a disastrous effect upon the retentive powers of the modern child. Another very interesting article in this month's number of *L'Hygiène* is by Dr. Lucien Jacquet, who has chosen the "Hygiène esthétique de la Femme" as his subject, and gives his women readers much useful advice concerning the preservation of their health and beauty. The illustrations are, as usual, numerous and beautifully reproduced.

The October number of the *Caledonian Medical Journal* has recently appeared with a table of contents which includes much that is of interest not only to the doctors of the Scottish Highlands, for whom it is primarily intended, but also to the general reader. This interesting little magazine, which is the mouthpiece of that band of Celtic physicians, the Caledonian Medical Society, is the only Highland medical periodical in existence, and one of its many aims is "to devote special attention to old Celtic literature in relation to medical science," and to "perpetuate the old Celtic literature and the old Celtic traditions, especially those relating to the medical profession." It is interesting to note that, thanks to the society, Dr. Gillies, of London, has been enabled to devote much time and labour to research work in this direction, the result of which should prove both interesting and useful to the student of Highland history. The presidential address, delivered by Dr. A. Cameron Miller, at the annual meeting of the society, which was held at Fort William on the 23rd of last September, published in this number, consists of a long and able criticism of "The Physician in Fiction," in which the author gives a most interesting account of the medical man as he appears throughout the whole range of English literature, from Chaucer's famous "Doctour of Phisik" to Ian Maclaren's equally famous and far more lovable country practitioner, Weelum Maclure, the "doctor of the old school." A paper from Professor John Gray M'Kendrick on his "Reminiscences of Lochaber in the Sixties" has also appeared in the present number, and gives a vivid picture of practice in a remote district in the Highlands some fifty years ago. Professor M'Kendrick spent four years as a resident medical officer of a small hospital situated at the foot of Ben Nevis, and one of his most interesting souvenirs relates to a Highland sheep farmer, Cameron of Strone, on the Lochiel estate, who enjoyed a large practice as bonesetter. "Cameron was a man of marked individuality, strong and vigorous in frame at 80 years of age, with a proud stern face . . . people came to him from far and near for the cure of sprains and stiff joints. I remember he had enormously powerful hands, and I can quite understand that in some cases he did good service by the breaking down of old adhesions, and by inspiring confidence in his patients." Cameron's healing powers descended to his children, a daughter and two sons, one of whom continued to practice after his father's death. The other son studied medicine, and promptly lost his gift! His brother, young Strone, says Professor M'Kendrick, "was a man of high principle, and I feel sure he honestly believed that he possessed a gift that was in some way supernatural."

British Medical Journal.

SATURDAY, NOVEMBER 5TH, 1910.

COMPLEMENT DEVIATION IN DIAGNOSIS.

IN this issue we publish a full account of the discussion on complement deviation in diagnosis, which was held at the conjoint meeting of the Pathological and Bacteriological Sections at the Annual Meeting.

The method of determining the presence of an antibody formed in response to an infection, from the fact that it combines with complement in the presence of the specific infecting organism, is barely ten years old. Since Bordet and Gengou originated this work much progress has been made, and particularly in connexion with syphilis, with which Professor Wassermann's name has become inseparably associated. Hence the opening paper by him, giving as it does a brief summary of the work since its inception and a summary of its results and its scope, enhances the value of the discussion.

As yet we know little about the substance called "complement," which indeed is only known to us by its activity. We know that it can be fixed or deviated or put out of action by entering into combination with antibodies in the presence of their specific antigen, or with haemolysins in the presence of the corresponding red blood corpuscles. It is this haemolytic action which enables us to say whether or no a complement in a serum has been fixed in a proper admixture, and so confirm a suspected infection.

The technique is complicated, necessitating much practice and experience, for the pitfalls likely to be met with in working with complement are many; as will be seen from Professor Muir's paper, complement can be deviated under many other conditions, and even by admixture with organic particles. But what is difficult to explain is that syphilis does not fall into line with other infections, for it is not even necessary to employ an extract of spirochaetes for the test; they can be replaced with extracts of normal tissues, and even by certain bodies of lipoid nature, with results seemingly of equal diagnostic value. Although this latter irregularity tended to produce the idea in some that the syphilitic reaction was an accidental and not a logical sequence of scientific observation, experience has shown that the value of the test is by no means lessened. But it is evident that the attitude of Wassermann, Dean, and others, who assert that in testing for the presence of antibodies arising from spirochaetal infection it is better to employ extracts of spirochaetes themselves, is the most logical one.

Numerous modifications have been introduced by workers in this field, having as their object the simplification of the technique and an increased accuracy of results, for a small percentage of syphilitics do not respond to the reaction.

As in all cases where scientific results are brought into the field of practical medicine there are two classes of workers—namely, those who are carrying out the test on the lines laid down by the originator and compiling statistics without questioning the truth of their premisses, and the smaller group, who are constantly investigating the scientific truths assumed to be the basis of the test. These latter are recognizing that the question is not so simple as at first appeared; complement in the hands of Henderson-Smith is not even simple complement, but from its action seems to consist of two fractions which can come into action separately. Antigen is being inquired into, and the different chemical substances which can replace it; so too is the nature of the antibodies, and especially those that are formed by allied organisms and give similar reactions, and thus account for the fact that the Wassermann reaction has been obtained in malaria and protozoal infections with syphilitic antigen.

But fascinating though these investigations may be, they do not become of interest to the busy practitioner until the practical outcome is brought within the sphere of his work. Without discussing the various modifications in technique, which are fully treated in the papers published, it will be sufficient to state that the results of all workers show that with careful technique we have at our disposal a most important and valuable addition to practical medicine. It is certain that syphilis can be diagnosed with certainty in at least 90 per cent. in all stages after the first few weeks following infection. In latent syphilis, also, the reaction is of value; Wassermann obtained a positive reaction in 100 per cent. of cases of general paralysis and of aortic aneurysms. Experience has taught that these conditions are sequels of syphilis, and so the confirmation by Wassermann's reaction is of interest.

But where the reaction is of real service is as an index to treatment. Bearing in mind that mercury influences the reaction for certain periods after administration, it is nevertheless evident that we have here a method of determining the results of treatment, the efficacy of different methods of treatment and the onset of relapses. Wassermann finds that in 50 per cent. of incompletely treated cases the reaction is still obtained; whilst even in those vigorously treated 20 per cent. still give it. We have still much to learn concerning the prognosis to be formed in cases which still give the reaction after treatment (in one case this appears to have been present fifty-four years after infection), but all are agreed that in complement deviation applied to syphilis we have a method of great assistance in diagnosis, therapy, and prophylaxis. To be able to diagnose latent syphilis is of great importance, to prevent relapses or sequels by timely medication is to make it a less fatal disease, and to be able to tell a patient whose fears have been aroused that he is free from infection is to alleviate much mental unrest.

As a diagnostic method we agree that it is not called for in every case, but only in doubtful cases. Further, its value is impaired by the fact that a small percentage of cases of infection give a negative reaction, which consequently must be regarded with suspicion. Hence the importance of making laboratory methods subservient to clinical experience; and here we venture to express the opinion that there is a regrettable tendency at the present day to throw more and more responsibility on laboratory aids to diagnosis at the expense of clinical methods. In primary infections the finding of spirochaetes is the most ready method of diagnosis, and recent staining methods have rendered this so simple as to be within the reach of all. Similarly in many other infections the organisms can be found before the antibodies are elaborated to a

sufficient extent to be determined; nevertheless there remains a number of diseases in which this method becomes of great practical value; this is especially the case in those diseases in which as yet no specific organism has been isolated.

In Germany the diagnosis of glanders is carried out by the complement-deviation method in central institutes, and though we in Great Britain are of the opinion that the mallein reaction is far more efficacious in diagnosis, it is obvious, in human cases, that a method necessitating merely the withdrawal of a little blood for examination is better, other things being equal, than one entailing the inoculation of toxins into the system. This is especially true when the present state of our ignorance concerning anaphylaxis or increase of susceptibility following inoculation is remembered.

Latent glanders is rife in our large cities even at the present day, and we are now awake to the danger of human infection, so that any method facilitating diagnosis is worthy of consideration.

It is of interest to note that the method of diagnosis has been applied in diseases due to animal parasites—for example, echinococcus, ankylostomiasis, etc.—with some success, and, as would be expected, it has been tried in cancer by Wakelin Barratt, who, however, had no success in human cancer and little in cancer of mice; but with regard to this it is, perhaps, as yet too early to judge.

We think it well to accentuate the fact that in Austria, Denmark, and other countries there are existing official sero-diagnostic institutions which permit of a general application of this method of diagnosis. Wassermann and his colleagues have performed in their institute over 10,000 examinations on supposed cases of syphilis. In this country the test has to be performed in private laboratories, which are greatly hampered by the restrictions regarding animal inoculations. It is true that some of the modifications have so simplified the technique as regards syphilis that many of these difficulties can be overcome in the smaller laboratories, but with the enlarging scope of the reaction and the inclusion of glanders and other diseases these difficulties again increase, and we would wish to see similar institutions in our large cities where the work could be carried out and from which smaller laboratories could obtain the necessary reagents for their own use.

THE VEGETABLE ALKALOIDS.

Considering their number and the certainty of their action, the vegetable alkaloids might be expected to figure largely in connexion with the criminal courts; but this is hardly the case. The occasions on which metallic poisons have been shown to have been used for criminal purposes are considerably more numerous. The vegetable alkaloids have frequently, of course, been the cause of cases of accidental poisoning, and it is possible that they have been used with criminal intent more frequently than the records reveal. This, however, does not seem, on the whole, very probable.

Of the whole class, only aconitine, strychnine, digitalin, morphine, and atropine would appear ever to have come under the notice of the criminal courts, either in this country or on the Continent, up to the beginning of this year. Hyoscine, as we all know, has now been added to the list, but it has made its criminal bow, so to speak, so very recently that even in the very latest English books on medico-legal toxicology it is not mentioned.

Digitalin seems to have been used once; this was in France in 1864, when a Madame de Pauw was poisoned by a homoeopath named De la Pommerais. Tardieu identified the poison by experiments with frogs, but, after the case was over, there continued to be a hot dispute as to the identity of what had been discovered.

As for aconitine, there appears to be only one record of its use as a homicidal poison. It was the drug used by Lamson to rid himself of his brother-in-law some twenty years ago. It was given in a capsule, and the victim, a schoolboy, died within four hours. The alkaloid was isolated by Dupré and Stevenson from the viscera, and its identity was proved, apart from chemical methods, by physiological tests on animals and on Stevenson himself.

The appearances of atropine in the criminal courts have been notably few, considering the number of accidental poisonings to which it has given rise and its very frequent use in therapeutics and ophthalmic surgery. No case of poisoning, both criminal and fatal, by its use would seem ever to have been proved, though in 1899 the Seine tribunal tried and convicted a certain Madame Bianchini of attempting to poison her husband by this drug. Nearly forty years ago an inquiry was also held into a case in the North of England in which it was alleged that a nurse at a workhouse had maliciously placed atropine in some milk, with the result that the resident medical officer died and several other persons were rendered ill.

Conium, as the essential principle of that historic poison, hemlock, might have been expected to enjoy some favour, but seems only to have been used in two cases. They both took place abroad, and of neither of them have we been able to ascertain particulars.

As for morphine it has doubtless been the cause of innumerable deaths, but mainly as the result of morphinomania, intentional suicide, misadventure, or overdosage; but so far as its homicidal use is concerned we can only find three records. The most recent is the Devereux case, which occurred some five years ago, when a druggist's assistant poisoned his wife and some of his children by this alkaloid.

Among the whole group strychnine has been the most prominent in this connexion. It was especially popular in the middle of last century, being the drug used by the notorious murderer, Palmer. Subsequent to his trial in 1856 it was revealed as the cause of death in several murders in comparatively rapid succession. It has also been proved to have been used homicidally in the last decade, the most recent notable case being that in which Neill Cream murdered four women and attempted the murder of a fifth. Neill Cream, it may be noted, claimed to have an American medical degree, and medical qualifications, indeed, we regret to say, have been possessed by several of those proved guilty of intentionally causing death by the use of vegetable alkaloids. In this connexion it may be said that if conceivably there are any circumstances whatever in which an appeal for mercy can reasonably be made in poisoning cases, it is certainly not when a medical man, or any other person well acquainted with its properties, have been proved to have used strychnine homicidally, for death from strychnine poisoning is one of the cruellest of ends.

One of the many vegetable alkaloids which have hitherto failed to figure in the courts is hyoscyamine, nevertheless, this alkaloid was, curiously enough, among the first of the class ever to be mentioned in

his connexion. Mr. J. E. P. Muddock, better known as "Dick Donovan," the author of a number of excellent sensational novels which still continue to appear from time to time, was, in the middle of the Seventies, on the outlook for a new plot, and decided that poisoning should play a prominent part therein. The difficulty was to find a poison which would suit the needs of his story, and eventually, after consultation with the late Sir Benjamin Ward Richardson, he pitched on hyoscyamine, at that time a drug practically unknown in this country. He secured a small amount of it and ascertained its effects by experiments on a cat. The novel is entitled *A Wingless Angel*, and is still procurable, we believe.

Taking the vegetable alkaloids as a whole, it may be said that much of our knowledge of their properties is due to homicidal instances of their use. These have served materially towards securing profound investigation of their characters and dissemination of acquaintance therewith. How little was known of strychnine, for instance, at the time of its use by Palmer in 1856 is clear from the nature of the evidence given by various medical witnesses in the course of that trial. It has been set forth in full more than once.

Hyoscine, the drug which figured in that case, has been the subject of a good deal of dispute among pharmacologists in respect of its chemical constitution. This, no doubt, is in a large measure due to the fact that it is obtained not only from *Hyoscyamus niger*, or black henbane, but from various members of the Scopola family, and the specimens examined by different chemists have possibly not always been identical in character. As a pure alkaloid it is practically unknown in medicine, since, owing to its syrupy consistence, it is difficult to handle. For this reason it is invariably used in the form of a salt. It obtained, and still retains to some extent, a good deal of favour among alienist practitioners, owing to its effect in calming excitement and producing sleep in cases of acute mania. It has also been used in the relief of chorea and other spasmodic disorders, and in a few other allied conditions.

The chief interest attaching to it, however, lies mainly in its use as an adjunct to or substitute for ordinary anaesthetics in cases in which either light anaesthesia is required or those in which the anaesthesia is likely to be prolonged and it is desired to restrict the use of ordinary anaesthetics as much as possible. We drew attention to its claims in this respect for the first time as far back as ten years ago, and repeated our allusions to the matter in several of the first years of this century. It was not, however, until the Annual Meeting at Sheffield some two years ago that the general body of the profession became alive to its value in this connexion and as a method of relieving the pains of labour.

Professor Krönig, of Freiburg, who had used hyoscine for such purposes for a long time, brought the matter forward on that occasion, and his statements were subsequently confirmed by Buist of Dundee, Macnaughton Jones of London, and others who had had experience of its use. For the purpose in question, it is used in association with morphine, and Krönig, it may be pointed out, referred to the drug as scopolamine, and always speaks and writes of the method he then described as "scopolamine-morphine narcosis." Since then reference to it has been made occasionally under the phrase of "hyoscine-morphine narcosis," but Krönig's term would seem the more desirable to adopt if only to distinguish the drug from its analogue hyoscyamine.

During the course of the late trial the precise method of the administration of hyoscine for therapeutic purposes came under some discussion, though in our account of the case we did not report that fact, as the Lord Chief Justice, who dealt with the topic, subsequently stated that the importance of the point was not what he had understood it to be. At one time hyoscine hydrobromide, the salt most commonly used, seems commonly to have been given by the mouth, and in this there is no difficulty, as its taste is readily concealed in chloroform water, or almost any sweetish flavoured fluid. But, as in the case of all very powerful drugs of which only very minute doses are given, and which are not intended for frequently repeated use, it is probably always better to use it hypodermically. Indeed, Krönig and some others who have used scopolamine largely, lay stress on its use in this way, and in this way only.

KING EDWARD MEMORIAL.

Writing in the *Times* of November 2nd as to the proposals in regard to a memorial to the late King Edward to be submitted to the general committee at its next meeting, Lord Northcote strongly advocates the scheme for the protection of human life in the tropics, by a great extension of that campaign against tropical disease which has already so largely abated the sum of human suffering. An appeal has been submitted to the Lord Mayor, and gratifying support has been received from representatives of most varied interests. Lord Northcote urges London to take the lead in the movement, and he trusts that, with the sympathy of the powerful committee at the Mansion House and some practical assistance of a substantial grant, the rest of the Empire will be encouraged to carry the movement further and to place once for all on a proper basis a matter which has been too long neglected. He says that Lord Crewe, Secretary of State for the Colonies, cordially approves of the objects of the appeal. Men of all parties have written in support, among them Mr. J. Ramsay Macdonald, Lord Northampton, Lord Rothschild, Lord Elgin, Lord Kitchener, and Mr. Joseph Chamberlain. In his letter Mr. Chamberlain expresses regret that he is not able to take an active part in this work, which he firmly believes has done more than anything else to make tropical life more possible to Europeans. In a letter to the Lord Mayor, Lord Northcote cites the following three examples of the effect on human life of measures taken as the result of such investigations in the domain of tropical diseases. First, with regard to malaria, he says that in Klang and Port Swettenham, two towns within the protected Federated Malay States, remedial measures were commenced in 1901. The deaths from malaria were in 1901, 368, and in 1905, 45. In the surrounding districts, where no measures were taken, the deaths for these years were respectively 266 and 351. In Hong Kong remedial measures were commenced in 1901. In that year the admissions to hospital were 1,294, and the deaths 132. In 1905 the admissions were 419, and the deaths 54. In 1904 the United States took over the administration of the zone of the Panama Canal; the deaths from malaria, which in 1906 were 821, had sunk in 1908 to 282. As to yellow fever, he points to the fact that in the city of Havana 35,952 persons perished of yellow fever between 1853 and 1900. The United States Government commenced r·medial

measures in 1900, and in 1907 only one case of yellow fever was reported. Then with regard to sleeping sickness, he points out that during the last three years steps have been taken in Uganda to stamp out sleeping sickness, an epidemic which in one district alone had destroyed some 200,000 people out of a total population of 300,000. In 1907 the deaths in the kingdom of Uganda numbered less than 4,000, and in 1908 they fell to 1,700. These cases, however, cover only a small portion of the field. Notwithstanding the rapid advance of knowledge in tropical diseases, there are many as yet unknown or imperfectly understood. The causation of blackwater fever, of dengue, of beri-beri, and of many other diseases, still calls for investigation. It was submitted to the committee that no more appropriate memorial to our late Sovereign could be proposed than the establishment of a fund to carry on and extend the work of research into tropical disease. It is further urged that it is eminently appropriate that London, the metropolis of the Empire, should take the lead in a movement for giving the full benefit of British administration to these outlying portions of the King's dominion, which have contributed in no small measure to her prosperity in the past, and will, by their development, give still ampler ground for her gratitude in the future. We earnestly hope that this scheme will be adopted, for no better memorial of King Edward could be imagined than one that would lessen the loss of life among colonists in the tropics, and thereby consolidate our Empire and lead to its expansion.

HOSPITAL ENTERPRISE.

Two conferences on matters relating to hospital enterprise have been held during the past week in the Council Chamber of the British Medical Association. Of the first of them a full account will be found in the Supplement to this week's issue, and should be carefully perused. The scheme discussed was first put forward in a prospectus privately circulated among those resident within the area of the Westminster Division of the Association some three months ago. It relates to the erection, furnishing, and maintenance of a private hospital or nursing home for forty patients in St. Vincent Square, Westminster, at an estimated initial cost of about £12,000. Such institution would have no honorary medical staff, and the patients admitted would be treated as if in their own homes by their ordinary medical attendants. The cost of erection would be provided by the formation of a private company solely consisting of medical men. The object, of course, is to enable medical men in Westminster to attend to their own patients, surrounded by the advantages of a building specially maintained as a place for the sick, and to be able to do so without sending those patients to nursing homes, where they would have to pay fees which many of them could not possibly afford. On turning to the account mentioned it will be found that Dr. Lauriston Shaw, who presided, set forth in admirably clear terms the factors which would have to be considered if such a home were to be successful. He also indicated his belief that the home should be under the control, not of the shareholders, but of some public body of medical men selected by the shareholders, but independent of them. The other conference took place last Tuesday. It was summoned by the Medical Charities Committee of the Metropolitan Counties Branch, and had as chairman the President of that Branch. The conference, to which delegates were appointed by the staffs of a large number of metropolitan hospitals, as well as by the Central Hospitals Committee of the British Medical Association, and by the Metropolitan Counties Branch, was an outcome of a resolution passed by the latter last February. That resolution read as follows: "As a step towards organizing medical opinion in London on the question of the conduct of out-patient departments of hospitals, and the most desirable system by which they can be made satisfactory to the subscribers, to the beneficiaries, and to the medical profession, it be an instruction to the Medical Charities Committee to call a conference of representatives elected by it from the Branch to meet representatives of the staffs of the hospitals directly concerned in order to consider these points." The meeting consequently summoned lasted over two hours, and was well attended, over fifty delegates being present. It did not, however, arrive at any final conclusion on the general question at issue, but on the motion of Dr. Biggs, seconded by Mr. Hugh Ker, decided to authorize the appointment of a committee of nine persons, consisting of the chairman and four members, to be chosen by the hospital staffs, and four members by the representatives of the Metropolitan Counties Branch, to prepare an agenda for a further meeting.

POLICY OF KING EDWARD'S HOSPITAL FUND.

It is announced that Prince Alexander of Teck intends to carry on the scheme projected by his brother, the late Prince Francis of Teck, for the benefit of the Middlesex Hospital, and by way of putting himself in a better position to do so has accepted the post of chairman of the hospital. The outline of the scheme in question was communicated to us by Prince Francis himself in a letter written shortly before his fatal and deeply regretted illness it appeared at p. 1000 of our issue for October 1st this year. Thanks to a notable combination of energy, industry, and tact, Prince Francis had then recently succeeded in completing his self-imposed task, that of clearing the Middlesex Hospital of the burden of its outstanding debt, by raising a sum of £20,000. But his general efforts were not to stop at that point. He proposed to commence forthwith a much more formidable task; this was so to increase the funded capital of the institution as to enable its governors always to pay their way and to devote themselves solely to seeing to the economic disposition of the hospital's income and to obtaining the best possible results from the combined efforts of themselves, of ordinary annual subscribers to the support of the institution, and of its professional staff. The additional annual income estimated to be required was £7,000, which means a capital of approximately £200,000. We have no doubt that had Prince Francis lived he would have succeeded in getting together this great sum within a comparatively brief period, and it is likely, though perhaps not quite so rapidly, still to be raised. At all events we hope so, for the sake of a very deserving and scientifically successful institution, whose managers are never lacking in enterprise or energy. The general interest of the scheme, however, lies in the fact that it should ever have been conceived. Had its proposer been an ordinary member of the philanthropic public little importance need have been attached to it, but Prince Francis was, quite apart from his connexion with royalty, by no means an ordinary philanthropist. He had been interested in hospital enterprise for good many years, and can hardly have decided to undertake such a task as that of placing the governors of the Middlesex Hospital in the happy position already mentioned without considering what might be the indirect as well as direct consequences of the achievement of his proposed task. It therefore seems just to assume that he had received an assurance that if he succeeded in his task the authorities

of King Edward's Hospital Fund would not promptly nullify his success by withdrawing the large donation which they have hitherto annually made to the funds of the hospital. Up to the present support from that fund has not been readily forthcoming for institutions whose governors have, by careful management in past days, put them on so sound a financial basis that they have considerable accumulated funds, and do not start each year's work without knowing how half or more of the year's expenditure will be met. Indeed, in the case of one or two institutions which are in this position—and notably so popular and important a place as St. Thomas's Hospital—contributions have been definitely refused year after year, much to the disapproval of many of those who in a general way regard the actions of the King's Fund as open to no criticism. In view, however, of Prince Francis's decision, there seems to be a possibility that this policy is now to be abandoned. This is eminently desirable, for the policy constitutes a practical invitation to previously carefully-administered institutions to reduce themselves to a position of comparative poverty.

THE CASES OF PLAGUE IN SUFFOLK.

THE information which the Local Government Board furnished to the public last week through the lay press concerning the plague cases in Suffolk will have been no news to our readers, for we mentioned these cases a fortnight ago. They had not at that time been officially declared to be plague, and indeed little, if anything, had been heard of them at all. We felt justified, however, in referring to the cases as instances of plague, as the information in our possession left no other conclusion possible. This being so, it seemed desirable to draw the attention of our readers to their occurrence, for though the Local Government Board did not at that time seem disposed to take the same view of the matter, it is only by the co-operation of the medical profession and the general public that the authorities can possibly hope to deal effectively with an outbreak of the kind in question. The sanitary authorities can usually deal with other classes of infectious disease effectively and without attracting any particular attention to them; and the same course is possible with cases of plague when they occur in direct connexion with shipping. But it is otherwise when cases break out in a country district and among persons not employed in docks. In such case there can be no reasonable doubt that the immediate cause of the disease in the human beings affected is more or less extensive prevalence of plague among the vermin in the neighbourhood. As we have already implied, such a focus of disease cannot effectively be circumscribed and extinguished without the active co-operation of the public, and, therefore, with its full knowledge. Nor is knowledge of the circumstances on the part of the public in itself undesirable, for, as we showed in the article in question, the tendency of the public now is to exhibit an admirably philosophic calm in the presence of infectious disorders. This is due partly to well-merited confidence in the sanitary department of the Local Government Board and its local representatives, and partly to the fact that the lay press has of late years thoughtfully refrained from fomenting excitement. This is as it should be, for, as was shown in the same article, the occurrence of cases of plague and cholera is this country from time to time can, for the reasons stated, no longer be regarded as extraordinary incidents. As regards the present outbreak, the right steps are now being taken and everything is going well. It is upwards of five weeks since the date of the death of the fourth patient, and the occurrence of others is not on the whole very probable; at any rate, nothing in the nature of a general outbreak can be regarded as in the least degree likely. Dealing with the disease in vermin will, however, be no light task. The infected vermin and ground game near Freston are likely to spread the disease to their neighbours in other districts, and in order to feel full assurance that it is being stamped out gamekeepers and farm hands in all parts of the country should be warned to keep on the outlook for dead animals, or for any evidence of unusual disease amongst them. Even should the disease continue to prevail amongst ground game and vermin, the probabilities of plague obtaining a lengthened foothold in this country are not great. It is in no wise an infectious disease properly so-called. The only truly infectious cases are those of a pneumonic type, and in these infection can readily be avoided by skilled nursing. In past times there has been a good deal of discussion as to the way in which the disease spreads but it is now fully agreed that it is solely through the operation of vermin. If rats can be excluded from houses and streets while infected with plague no one even in the most plague-stricken country runs much risk. It is not the rats themselves which are a danger, but the fleas which live upon them. These fleas, it is to be noted, are not the same as the fleas which infest human beings, but a special kind. They do not usually bite human beings, but are not more particular than their hosts in respect of their food, should they be deprived of their natural nourishment, which is rat's blood. These statements may possibly seem difficult of acceptance by those who have the Great Plague of London in their minds, but it is to be remembered that it is not absolutely certain that that plague was identical with modern plague, and in any case the domestic habits of our forefathers and the structure of their houses, and their fashion of furnishing them, were admirably designed to lead to the prevalence of any disease due primarily to rats and their parasites.

MEDICAL EXPERT EVIDENCE.

AT this time, when the question of expert medical evidence is being much discussed, it may not be out of place to quote the views of a man who played a notable part in many notable trials. Sir Robert Christison, in his *Autobiography*,[1] speaking of the early part of his professional career, says: "My progress in medico-legal knowledge was greatly promoted and the practical bearing of the lectures much enhanced by constant practice as a reporter in precognitions and as a witness in courts of law, first in criminal trials, and soon in civil actions also. My earliest appearances were on the side of the prisoner in the Justiciary Court, the young counsel coming to me for the discovery of loopholes in the case for the Crown—flaws which it was easy enough to find in the defective medico-legal inquiries of the day. But Solicitor-General Hope, afterwards Lord Justice-Clerk, saw the inconvenience arising from obstructions thus thrown in his way, and by his advice I became unacknowledged standing medical counsel 'for His Majesty's interest.' My previous training as witness on the prisoner's side, and the wise advice of my elder brother, with whom I continued to keep house, led me always to look at both sides of the question. So far as the medical relations of a case were concerned, I thus became umpire between the prosecutor and the prisoner in the precognition. In point of fact, I thus

[1] *The Life of Sir Robert Christison, Bart., M.D., D.C.L.Oxon., LL.D Edin., Professor of Materia Medica in the University of Edinburgh, Physician to the Queen for Scotland, etc.* Edited by his Sons. In two volumes. Vol. I, Autobiography. Edinburgh and London: William Blackwood and Sons. 1885.

on several occasions put a stop to further procedure, either by eliciting proof of innocence, or by showing the inconclusiveness of evidence, and the futility of proceeding to trial. I followed the same rule in my inquiries and evidence in civil actions, in which it is even more necessary to be on guard against the one-sidedness of the preliminary investigations. Once during an inquiry of this kind, I was roundly charged by the agent with precognoscing for the opposite party rather than on the side for which I was employed. It would have served no good end to have informed this gentleman that, whatever might be his duty in the case, mine was to find out the truth. But I silenced his scruples by letting him see that, if my services as his witness were to be turned to good account, I must know as much as possible of the other side, in order to stand cross-examination; that I could rely on him putting me well up to the facts on his own side, but that for those on the opposite side I had found I must always depend very much upon myself. The consequence of this mode of procedure was that I cannot recall a single instance of my evidence-in-chief having been shaken in cross-examination. In general, indeed, it was rather strengthened by points being brought out which had been overlooked in my primary evidence, and which the cross-examining counsel had better have let alone. Hence the leading members of the Bar ceased to cross-examine me; or, when they did, it was to bring out some point in favour of their client, which they knew beforehand that I possessed, and was quite ready to produce if desired." Christison goes on to say that he thus gained the approbation of both Bar and Bench. He expresses the hope that all his brethren will profit by his experience, and put an end to the disgrace under which scientific equally with all sorts of professional evidence has for some time lain, of being rather the pleading of a counsel than the testimony of a witness. It cannot be denied that in all professions and sciences men may now be got to defend, on their oath as witnesses, any case in which there is a little show of reasonable doubt. After referring to medical evidence in cases of railway accidents, he says he saw enough to determine him never to have anything to do with the trade of medical witness in such trials. He proceeds: "Much mischief, however, had been done previously to the character of medical testimony in the Scottish law courts by a small section of men, belonging to the extra-academical school of medicine, who could scarcely ever meet a university man on a public occasion without setting up their backs and spitting at him. It was quite enough that a professor was a professional witness in a court of law for one of this brotherhood to appear on the other side; nor did they ever seem taken aback by the sorry figure they were made to cut on divers occasions. One of them was rather vain of the frequency with which Henry Cockburn, then at the Bar, had him engaged whenever he was counsel. The witness would not have been so proud of his post had he known why he so often filled it. On one occasion the agent in a case in which Cockburn was counsel, remarking that a medical witness would be wanted, asked whether he should see Dr. —— on the subject. 'No, no!' said Cockburn, 'go to Dr. ——. He will say anything you like.' The following is a specimen I heard of a cross-examination of this friend of Cockburn. In a trial for poisoning with arsenic—the last occasion on which an attempt was made to dispute the validity of the chemical evidence in arsenical poisoning—Dr. —— was employed to make a muddle of the professional testimony; and this was how he set about it. The proof, from symptoms during life and morbid appearances after death—apart from irrefragable chemical proof of the presence of arsenic in the stomach—was unusually strong, perhaps singly conclusive. But Dr. —— had not difficulties. 'He had great experience of disease. Vast experience in pathological dissections. There was nothing in the symptoms of the deceased during her life which he had not seen again and again arising from natural disease; nothing in the appearances in the dead body which he had not seen twenty times as arising from natural causes.' 'But, Dr. ——,' said the Lord Advocate, 'the symptoms you have heard detailed, and which you say may have arisen from natural disease, are also such as arsenic may produce, are they not?' 'They may be all produced by natural disease.' 'So you have already told us. But may they not also be produced by arsenic?' 'They may; but natural disease may equally cause them.' 'You need not repeat that information, doctor. Give me a simple answer to my simple question: May these symptoms be produced by arsenic? Yea or Nay?' 'Yes.' 'Now, Dr. ——, you have also told us that the appearances found after death were such as natural disease may produce. Are they not also such as may be produced by arsenic?' 'Natural causes may account for them all,' etc., through the same round of fencing, until he was compelled to admit that arsenic might produce them. 'Now, Doctor,' continued the Lord Advocate, 'you have heard the evidence of arsenic having been found in the stomach of the woman. Are you satisfied that arsenic was discovered there?' 'My Lord, I am no judge of chemical evidence.' 'Then, Dr. ——, in that case I must tell you that it will be my duty to represent to the jury and judges that arsenic was unequivocally detected; and I ask you this—Suppose arsenic was detected, what in that case do you think was the cause of these symptoms, and of these signs in the dead body?' 'Natural disease might cause them all.' 'Yes! yes! we all know that. But suppose that arsenic was found in the stomach, what then would be your opinion as to their cause?' A pause on the part of the doctor, now run to earth. 'Do you not think, sir, that in that case arsenic was the cause?' Softly and reluctantly came the inevitable answer, 'Yes.' 'One more question, then, and I have done: 'In your opinion, did this person die of poisoning with arsenic?' 'Yes.' 'Have you any doubt of it.' 'No.' 'Then' (sotto voce, yet audibly enough), 'what the devil brought you here?'"

"COMPURGATION."

In another part of this issue appears a letter from Dr. Charles Mercier. His Berserk ardour is less full-blooded than usual, and his humour perhaps not quite up to his ordinary standard. Still, on the whole, the letter is typical, so we trust that readers will join us in enjoying it. It is true that in places its meaning seems to us obscure, but that may be due to our lack of apprehension. The first paragraph, for instance, may be variously interpreted as meaning that conflicts of medical testimony are 2,000 years old, or that our suggestion for their avoidance is of the same date, or that Dr. Mercier first began admiringly to watch our "sleepless vigilance" much about the same period. We have no objection to his applying the term "compurgation" to the method mentioned in our article, but shall be glad if Dr. Mercier will take it from us that we do not accept as accurate his description of the application either of that ancient ceremony or of our own method. We suggest that he should read up the subject again, and meanwhile beg his permission to point out that our own form of "compurgation," at any rate,

includes no idea of the defence or prosecution vying in respect of the number of their medical witnesses and the verdict falling to the side with the top score. We merely suggested the adoption in all cases of a system which, so far as its central principle is concerned, has already been applied by the Legislature to compensation cases. If this were done the medical evidence, and the witnesses giving it, would, as Dr. Mercier justly desires, be weighed, but would be weighed by competent persons, instead of by uninformed jurymen. The object is the avoidance of unedifying medical conflicts or of such Homeric combats as might be expected to ensue if Dr. Mercier himself, for instance, found himself faced, say, by some professional "expert" well known to the public which reads the "Yellow Press" but of lower standing in the eyes of the profession. The scene would be amusing, but might possibly lead to a grave miscarriage of justice. The two combatants would be forced by their respective counsel to give—very unwillingly, no doubt—full descriptions of their qualifications, attainments, and performances, and if those of Dr. Mercier happened to make a slighter impression on the jury than those of the other expert, the side represented by the former would be initially prejudiced. If subsequently the Yellow Press expert gave his evidence in a clear, convincing manner, and Dr. Mercier followed with a deliverance beyond the understanding of the ordinary man, such as that which we now have the pleasure of laying before our readers, his side would run a serious risk of losing the day. This would be a pity, for it is quite probable that of the opposed views expressed by the two witnesses Dr. Mercier's might really be the sounder.

A NIGHTINGALE MEMORIAL.

A WELL-ATTENDED meeting was held on October 28th at Grosvenor House, by permission of the Duke of Westminster, for the purpose of considering the question of raising a fund as a national memorial to Miss Florence Nightingale and the direct object to which such fund would best be devoted. The net outcome was a decision to start such a fund, and the appointment of a committee to deal with the matter. The persons selected were Mr. Haldane, Lords Crewe, Pembroke, Selborne, and Charles Beresford, Mr. Shore Nightingale, Miss McCall, and the Presidents of the Royal College of Physicians and the Royal College of Surgeons, Sir Thomas Barlow and Mr. H. T. Butlin respectively. Subsequently the names of Sir William Treloar and Sir Joseph Dimsdale were added to the committee, and the latter was given power to add to its number some representatives of the nursing profession additional to Miss McCall. In the course of the meeting it was mentioned that eight of Miss Nightingale's original band of workers are still alive; three of them being nuns are supported by the sisterhoods to which they belong, three others are supported partly by their own means and partly by assistance from their friends and relatives, and the remaining two are practically in the position of paupers. It was also suggested that one excellent plan of perpetuating the memory of Miss Florence Nightingale would be to devote the fund to the benefit of nurses who are past work and in want. This did not meet with the approval of Mrs. Bedford Fenwick. Nevertheless, we hope it will be taken into favourable consideration by the executive committee. There is nothing degrading to the profession of nursing in such a proposal, nor could it conceivably have any pauperizing influence on its members. Similar funds exist for the benefit of members of nearly all professions, and to most of them persons not belonging to those professions do occasionally, or have at some time, contributed. Nurses, whether they work in or out of hospitals, are essentially public servants, and there is no class which is better entitled to receive assistance from the public as a body. A certain proportion of them are reasonably, and some well paid, when engaged in private work, but the years for which they can hope to work successfully as private nurses are comparatively few, and no nurses whatever receive sufficient pay to make it reasonable to expect that they should invariably save enough to provide for their old age. A few hospitals do provide retiring funds for their nurses, but most nurses when they grow old have very little, if anything, between themselves and the workhouse. The unfortunate position of nurses in this respect would long since have pressed itself on the public notice but for the fact that for a long time the modern nurse was recruited chiefly from among the comparatively well-to-do classes. It is true that there is a provident association of which nurses can become members, but the utmost annuity which they can expect to receive must seem to many of them microscopic in comparison with the premiums which have to be paid. To obtain an annuity of £30 at the age of 50 means the annual payment throughout her working life of little less than 50 per cent. of the salary of an ordinary nurse.

A SANATORIUM FOR MIDDLESEX.

WE understand that next Tuesday (November 8th) a meeting of Middlesex residents is to be held at Burlington House for the purpose of starting a subscription for a memorial to the late King. We also gather that there will be put forward a suggestion to the effect that this county memorial shall take the form of a sanatorium for those suffering from pulmonary tuberculosis. It is a proposition in favour of which a great deal may be said, and since elsewhere similar plans of commemorating one who said "If preventable, why not prevented?" have been received with much approval, it seems not unlikely to be adopted. The idea of creating a sanatorium for Middlesex is not altogether new; a scheme for one was put forward nearly a year ago, and in our issue for May 7th we gave some account of what had been done up to that time. Committees had been established in several localities in Middlesex, some large donations had been promised, and the rest of the money required it was expected to raise by 5s. subscriptions. Since then we have not received any information as to its progress, but if, as now seems to be in view, it is adopted by the county in the fashion indicated, it may be expected to be put through very promptly. The plan provided for the establishment of a "working class" sanatorium of 100 beds at an estimated outlay of about £100 a bed, in addition to the cost of land. It was anticipated, not without reason, that the institution, once started, would prove self-supporting, in the sense that there would always be plenty of applicants ready and able to pay the estimated cost of their maintenance—namely, 25s.—and that options on bed accommodation would be secured by various boards of guardians. At the rate of £100 a bed, the building and furnishing outlay would be just £10,000, and there should be no difficulty in raising this sum in addition to whatever may prove to be the cost of a suitable site. Indeed, £10,000 might not inconceivably be found sufficient to provide accommodation for a good many more than a hundred patients if the very simple forms of building, which are really all that is necessary, were adopted. In this connexion it would be well, if the plan of a sanatorium meets with the approval of the meeting, for those charged with putting the scheme into execution to examine the arrangements at the Arthur Boyd

Memorial Sanatorium in Essex. An outline of them will be found on page 894 of our issue for September 24th, under the heading of "A New Sanatorium Development."

THE PUBLIC AT SENSATIONAL TRIALS.

OUR contemporary, the *Law Journal*, complains of the issue of tickets to members of the public to the Crippen trial. There can be no doubt it is a grave scandal, and productive of much mischief. A certain number of the public should be admitted, but it should be strictly limited, and no encouragement should be given to mere curiosity. Members of the Bar and bona fide students of forensic medicine should have facilities offered to them, as it is of the utmost importance that they should have such opportunities of improving their knowledge. In the recent trial many barristers were altogether excluded, and many more were compelled to stand in the body of the court in a dense crowd of men and women who had no claims to be present beyond the desire to witness a man being tried for his life, and to gloat over the prurient details connected with that trial. Even some press reporters found it impossible to get accommodation. In these respects the arrangements for the trial reflected no credit on those responsible for them.

THE ROYAL SOCIETY OF MEDICINE.

A MANSION HOUSE COMMITTEE has been formed for the purpose of assisting the Royal Society of Medicine to collect the sum necessary for the erection of its new home. The site for this is at the Cavendish Square end of Wimpole Street, and the total sum estimated to be required is something between £40,000 and £50,000. Of this sum a little under £9,000 has been subscribed by members of the medical profession, while another £17,000 has been provided by the society itself. On behalf of the appeal the Lord Mayor has issued a statement to the effect that the society has been engaged in work of the utmost value, not only to the State but to mankind, for many years, and that its Fellows have not spared time, trouble, or expense in carrying on a really national work. In no circumstances, it is added, can it be said that the public work in question has been of the slightest personal advantage to the individual workers, or even to the society. It has been philanthropic in the fullest sense of the word. The very success of its efforts, the statement continues, has so enlarged the demand for still greater development that the society finds itself compelled to provide new and larger premises. Hence it now quite justly asks that those who are interested in promoting the health of the nation, and in preventing as well as curing disease, should at least supply a portion of the necessary funds. Hitherto the Royal Society of Medicine has been generally regarded as in essence a private body of medical men, associated for the purpose of confidential discussion of various points in medicine and surgery; and we confess we were not ourselves aware that it differentiated itself in this respect from other societies of like kind in the towns, and more especially the capitals of the three countries, or that it considered itself to have an ordinarily so-called public part to play. In common with all its compeers it certainly does do work for the public, and is destined to do still more; for the discussions carried on at the meetings of any such body must in the long run necessarily help to promote the cause of public health and the well-being of individuals. This being the case, if the Society considers that it has a mission which it cannot fulfil without an appeal to the Mansion House for assistance, the medical profession in common with ourselves will hope that its effort will be greeted with entire success.

THE sixth International Congress of Obstetrics and Gynaecology will be held at Berlin in 1912.

THE King has graciously consented to become Patron of Epsom College, in succession to his late father, King Edward VII.

THE next session of the General Medical Council will begin on Tuesday, November 22nd, when Sir Donald MacAlister, the President, will take the chair at 2 p.m.

THE dinner of the Glasgow University Club, London, will be held at the Gaiety Restaurant, Strand, W.C., on Friday, November 25th, at 7.15 for 7.30 p.m., the Right Hon. Lord Curzon of Kedleston, Lord Rector of the University, in the chair. Members who intend to be present, or to introduce guests, are requested to give notice as early as possible to the Honorary Secretaries, 4, Bryanston Street, Portman Square, W.

AN informal conference will be held at the office of the Charity Organization Society, Denison House, Vauxhall Bridge Road, on Friday, November 4th, at 3 o'clock, to discuss the care and employment of consumptives discharged from sanatoriums. Dr. Jane Walker, of Maltings Farm Sanatorium, will open the conference. A large number of representatives of chest hospitals, sanatoriums, health societies, etc., will be present.

IT is announced that the Nobel prize for medicine has this year been awarded to Dr. Albrecht Kossel, Professor of Physiology in the University of Heidelberg. Professor Kossel, who is 57 years of age, has devoted himself mainly to the investigation of the chemical constitution of proteid matters. His principal work, entitled, *Researches on Nucleins and the Products of their Division*, was published at Strassburg in 1881.

A COMMITTEE, of which Professor Bianchi, Member of the Chamber of Deputies, and former Minister of Public Instruction, is president, was formed some time ago for the purpose of collecting funds for the erection of a monument in memory of Cesare Lombroso. Professor Tamburini, of the University of Rome, is the vice-president, and Professor Enrico Ferri, Member of the Chamber of Deputies, and professor of criminal law in the university of Rome, is the general secretary. The municipal council of Verona, Lombroso's birthplace, has voted £200 towards the cost.

DURING the Fourth International Congress on the Care of the Insane, held in Berlin, October 3rd to 7th, an International League against Epilepsy was founded under the presidency of Professor Tamburini of Rome. The head quarters of the League are at the offices of the Bureau of International Congresses at The Hague, the secretary of which is Professor H. Burger of Amsterdam. The official organ of the League is the periodical entitled *Epilepsia*, published by Johann Ambrosius Barth, of Leipzig. Next year the League will meet at Zurich, when the results of an international investigation which has been set on foot will be presented.

England and Wales.

[FROM OUR SPECIAL CORRESPONDENTS.]

LONDON.

Medical Inspection of School Children.

The London County Council on November 1st had before it (1) a summary by the Education Committee of the annual report of the medical officer of health (education); (2) the letter from the Board of Education criticizing the Council's arrangements for medical inspection (British Medical Journal, October 22nd, 1910, p. 1272); the draft letter in reply thereto drawn up by the Education Committee (British Medical Journal, October 29th, p. 1364); and (3) the modified arrangements for medical inspection approved by the Education Committee in July last (British Medical Journal, July 30th, 1910, p. 293). On these various subjects a protracted debate took place, in the course of which the Council's scheme for medical inspection and treatment came in for criticism, and the majority on the Council was reproached that London after being the pioneer of medical inspection, which was introduced ten years ago under the old School Board, should now receive a severe rebuke from the Board of Education on account of the inadequacy of its arrangements.

Mr. Hobson criticized in detail the Education Committee's estimate of the number of inspections which could be made in twelve months by 100 quarter-time medical officers. It was proposed to inspect the children at three periods—on admission to the schools and between the ages of 8 and 9 and 12 and 13. He congratulated the committee on being in advance in that respect of the Board of Education, whose proposals were too narrow. The number requiring inspection was estimated at 220,000, and to inspect these a staff of 100 quarter-time doctors was to be provided. Taking 100 quarter-time doctors as equivalent to 30 full-time doctors (the quarter-time doctors did rather more than a quarter of a week's work), and deducting one-fifth, or 6 doctors, whose time would be taken up with other work—urgent cases, re-examinations, and so forth—there remained 24 doctors to do the work—not in a year, but before July 31st next. The Board of Education, in one of the gravest and most considered rebukes an education authority had ever received from a Government department, gave 7,000 cases as the absolute maximum one doctor working full time could examine in a year. This figure, multiplied by 24, the number of the full-time doctors, gave 168,000, leaving a deficit of 54,000. Until January 1st, 1911, only 72 quarter-time doctors would be at work, so that this figure was an under-statement. Mr. Hobson quoted figures relating to the number of medical inspections carried out in Surrey and Bradford, and arrived at the conclusion that the number of 7,000 cases per full-time doctor was not wide of the mark.

Mr. Frank Smith urged that the Council was on the wrong lines, because inspection was not being properly followed up with treatment. The plan of making use of hospitals for carrying out medical treatment was doing a disservice to those institutions, because people were arguing that as hospitals were being subsidized from the rates there was no need to subscribe. Thanks to the intervention of the Council, poor parents were being deprived of the free access to the hospitals they formerly enjoyed. A case had been brought to his notice in which a parent, entirely on his own initiative, sent his child to an ophthalmic hospital. The child was asked what school it attended, and a few days later the father was surprised to receive from the Council's Care Committee a notice calling upon him to pay the cost of treatment on penalty of a fine or a term of imprisonment. To such a pass had the great hospitals been brought!

Mr. Cyril Jackson, Chairman of the Committee, replying to the points raised, said Dr. Kerr was the pioneer of medical inspection in this country, and the Council ought to pay attention to his opinion that with the proposed staff the requirements of the Board of Education could be carried out. If it was found that the work was getting behind, a little of the inspection which the Board did not require might be dropped for a time, or a few extra doctors could be appointed. As to quarter-time as opposed to full-time doctors, the quarter-time system was tried on the medical officer's advice, his view being that it led to the Council getting the services of a large number of very able young doctors who could give part of their time whilst they were building up a practice. On the other hand, there were advantages in appointing full-time officers, and the question might be reconsidered at any time it was thought desirable.

An amendment requiring the Education Committee to submit definitely a supplemental estimate, in order that the number of school doctors might be increased, was rejected by 62 votes to 45.

The Council then approved the scheme for enlarging the scope of medical inspection, and for the rearrangement of the medical staff as follows: The number of half-time and quarter-time assistant medical officers to be reduced by one each, and three additional full-time assistant medical officers to be appointed, two as from January 1st, 1911, and one as from September 1st, 1911, each at a salary of £500 a year. From September 1st, 1911, the present scheme for the appointment of part-time school doctors to be abolished and to be superseded by the following scheme: One hundred school doctors to be employed each at a salary of £120 a year, including travelling expenses; 25 doctors to retire as from August 31st, 1912, and thereafter to 25 yearly, the vacancies thus caused being filled by the appointment of 25 doctors yearly.

The proposed reply to the Board of Education's letter was not reached in time to be dealt with. The report of the medical officer of health was ordered to be placed on sale.

The Central Coronership for London.

The Public Control Committee reported to the London County Council on November 1st, with regard to the appointment of a coroner to the Central District of London, vacant through the death of Dr. George Danford Thomas. In response to the advertisement, forty-one candidates offered themselves, and three names, in accordance with precedent, were submitted by the Committee. These were:

Grant, Charles Graham, V.D., 3, Great Ormond Street, W.C., and 523, Commercial Road, East; aged 46. Qualifications: Barrister-at-law; L.R.C.P. and S.Edin.; police surgeon "H" division; late medical officer at Rotherhithe tunnel works; Lieutenant-Colonel R.A.M.C. (T.); author of Police Surgeon's Emergency Guide, etc.: surgeon to the Poplar Hospital; Post Office medical officer, Eastern district. As police surgeon has acquired knowledge of the law of evidence, his duties necessitating frequent attendance at the Central Criminal Court, London sessions, etc.

Oddie, Samuel Ingleby, 1, Essex Court, Temple, E.C.; aged 40. Qualifications: Barrister-at-law; M.B. and M.S. (Edin.): deputy coroner for West London since January, 1903; surgeon in Royal Navy, 1892 to 1895; general medical practitioner, 1895 to 1898. Has held over 1,100 inquests in West London, and has also held inquests in Central London and North-East London. Has for some years been endeavouring to qualify thoroughly for the position of coroner.

Schröder, Walter, Coroner's Court, Paddington Green, W.; aged 55 Qualifications: Honorary secretary to the Coroners' Society of England and Wales; acting coroner for central district of London. Has had thirty-nine years' uninterrupted experience of coroner's work—in 1871 with Dr. Edwin Lankester, coroner for Middlesex, then with his successor, and since 1881 with Dr. Danford Thomas. In 1894 was appointed deputy coroner for Central Middlesex, in 1895 deputy coroner for South-west London and Surrey, and in 1899 deputy coroner for the central district of London; has held over 9,000 inquests, assisted at 20,000 others, and considered 60,000 deaths reported for preliminary investigation; has co-operated and been consulted upon important laws, reforms, and suggested reforms affecting coroners.

The Public Control Committee recommended Mr. Oddie for the appointment, as he had both a medical and legal qualification, and Mr. T. C. E. Goff moved the adoption of the recommendation.

Mr. W. Haydon, Vice-Chairman of the Committee, moved an amendment substituting the name of Mr. Schröder for that of Mr. Oddie. Mr. Schröder

had the unrivalled asset of his vast experience. He believed Mr. Schröder, if appointed, would waive his claim to a pension if retired under the age limit in ten years' time.

On being put the amendment was carried by 52 votes to 17.

Mr. W. C. Johnson moved a further amendment—that one of the conditions of the appointment be that Mr. Schröder waived any claim to a pension.

Mr. Casson protested against the amendment, and said Mr. Schröder had devoted the best part of his life to the work of a coroner, and it would be unfair to say, when he reached the age limit, that he should not be able to claim a pension which, in any case, would not amount to more than £175 a year.

The amendment was defeated by 34 votes to 27, and Mr. Schröder then received the congratulations of the Chairman and took the oath of office.

THE CENTRAL CORONERSHIP FOR MIDDLESEX.

The late Dr. Danford Thomas also held the coronership for the Central District of Middlesex, to which the salary of £190 per annum is attached, and the Middlesex County Council on October 27th deliberated as to filling the vacancy. The district includes Finchley, Friern Barnet, Hendon, Hornsey, and part of South Mimms, and the coroner has to provide his own office accommodation and expenses, apart from the actual disbursements at inquests.

The General Purposes Committee reported that seventeen applications had been received, and of these three had been selected for submission to the Council. Dr. George Cohen was a barrister, and held the degrees of M.B., C.M., was still, and had been engaged for seventeen years, in a medical practice—for eleven years in Harringay. He attended St. Bartholomew's Hospital, the Royal Infirmary, Edinburgh, and the Rotunda Hospital, Dublin. He had held appointments as Resident Medical Officer of the Hospital of Diseases of the Heart, London, Assistant Medical Officer to the Stepney Sick Asylum, and temporary Assistant Medical Officer at Claybury Asylum, and for two years was Surgeon in the P. and O. Company. He was 40 years of age.

Dr. Cohen received the appointment, and agreed to give a written assurance not to accept any other appointment of coroner or deputy coroner.

LEADLESS GLAZE.

The London County Council has decided to follow the practice of H.M. Office of Works and stipulate that crockery supplied under the various contracts must be of leadless glaze.

MANCHESTER AND DISTRICT.

MEDICAL TREATMENT OF SCHOOL CHILDREN.

ON the authority of the School Medical Officer to the Manchester Education Committee it is stated that the only matters in which the Manchester Education Committee takes up the question of treatment are the following: (1) The provision of meals; (2) the provision of spectacles where prescribed by qualified medical men; (3) treatment of stammering; (4) treatment of such crippled children as are admitted to the residential school; (5) the treatment of such epileptics as are admitted to the residential school; (6) the deaf and dumb, blind, and mentally defective children being in a residential institution are also treated, and treatment is provided for children attending industrial schools. The School Medical Officer says he is not aware of any intention of the Education Committee to make further provision for treatment.

A CASE OF LEAD POISONING.

At an inquest held at Crewe last week on a young married woman, the medical evidence was to the effect that death was due to poisoning caused by taking certain pills and medicines containing lead, and the medical witness said there was a good deal of that sort of thing in Crewe. The coroner said it was alarming to hear of such a practice in Crewe, though he knew it was prevalent in Yorkshire. He would do his best to put a stop to it, but he thought the Legislature should take steps to stop such a dreadful thing. It was stated that the mother of the deceased had given her the medicine. The mother denied it, but the coroner severely censured her, and said he regretted that the evidence was not strong enough to put her on trial for manslaughter. It was not definitely stated in the press accounts what the object was in taking such medicines in this case, but there are grounds for believing that in the Manchester and Salford district it is by no means rare for common emplastrum plumbi to be bought, bits picked off, and rolled up into pills in the fingers, which are then sold by old "Mother Gamps" at extortionate prices for the purpose of procuring abortion. The writer of this note has attended a married woman who, during the space of about a month, took three dozen such pills, for which she paid an old woman, whose name she refused to divulge, the sum of a guinea a dozen. She almost died of lead poisoning, but no abortion took place.

SALFORD ROYAL HOSPITAL.

At the annual meeting of the subscribers to the Salford Royal Hospital, the President, Sir Wm. Mather, suggested that the Government should make grants in aid to all voluntary hospitals in view of the financial difficulties under which most of them laboured. This, he thought, might easily be done in a way that would not lessen but rather encourage voluntary subscriptions. Sir George Agnew, M.P., who has just succeeded to the baronetcy on the death of his father, hoped that the time would never come when hospitals would depend entirely on the municipality or the State. Mr. L. Pilkington submitted the annual report, which stated that during the year 29,069 patients had been treated at the hospital and its branch dispensary at Pendleton. The income for the year was £8,128, and the expenditure £8,315. Referring to the distribution of the Hospital Saturday and Sunday Funds, he said that Salford subscribed over £2,500 to these funds, but the Salford Royal Hospital, which is practically the only hospital in the town, only received £555 from the funds, and he did not think that Salford could be content with that amount. The Mayor of Salford said that a special committee was inquiring into the distribution of the funds, and he believed a scheme would be produced that might satisfy both Manchester and Salford, but it must be remembered that the people of Salford benefited just as much from the numerous hospitals in Manchester as the inhabitants of Manchester. Sir Wm. Mather expressed his gratification that £50,000 had now been raised towards the hospital extension, but he trusted that the need for obtaining the full sum of £70,000 would be kept before the public. It was announced that the King had recently consented to become the patron of the hospital.

THE LATE MR. J. E. PLATT.

At a meeting of the Board of Management of the Manchester Royal Infirmary it was announced that Mrs. J. E. Platt, widow of the late Mr. J. E. Platt, had written stating that, as her husband had been intimately associated with the infirmary as honorary surgeon, she was desirous of doing something in his memory. She proposed to endow a bed in one of the female wards and to set up a tablet stating that it was endowed in memory of her husband, and she therefore enclosed a cheque for £1,000 for the purpose. In accepting the offer, the board passed a most hearty vote of thanks for the handsome donation.

LIVERPOOL.

PRESENTATION TO SIR JAMES AND LADY BARR.

ON Thursday, October 27th, Sir James and Lady Barr were entertained at dinner at the Adelphi Hotel. Sir James Barr lately resigned his appointment as Physician to the Royal Infirmary. The occasion celebrated his long and valuable services to the Royal Infirmary, the Northern Hospital, and the various other institutions which have afforded a field for his kindly and

able activity. As a permanent memorial of the occasion, Sir James and Lady Barr were presented with their portraits by Mr. and Mrs. Hall Neale. Mr. Paul, as Chairman of the Presentation Committee, presided at the dinner; 152 were present, including 65 ladies. In proposing the health of Sir James and Lady Barr, Mr. Paul said that those present would understand the enthusiasm with which this presentation was initiated by the colleagues of Sir James at the Royal Infirmary; they wished to express in the strongest way their esteem and affection. Sir James Barr had left the institution with the good wishes of all his colleagues and the enthusiastic admiration of all his friends. Mr. Paul went on to sketch Sir James's career in Liverpool, which began thirty-six years ago, and before closing alluded gracefully to the popularity of Lady Barr. The toast was to have been seconded by Dr. Caton, but in his absence Sir Rubert Boyce spoke both as a grateful patient and as a colleague on the Senate of the Liverpool University. He said that Sir James Barr was characterized by the qualities of courage, honesty, and earnestness, and that the medical profession recognized in him one who set forth his own convictions as a fair and courageous judge.

Sir James Barr, in replying, spoke of what small matters influenced a man's career. In his case, after a voyage to South America, he applied for two resident appointments, one at the Liverpool Northern Hospital, and the other at Swansea; both of these were offered him, but Liverpool came first. He spoke of a memorable occasion on which he was summoned by telegram to Dublin Castle by Sir Edmund du Cane, who was ignorant of the fact that he was an Irishman. The English Prisons Board on this occasion had sent an inspector of prisons and an engineer—Colonel Stopford and Major Beamish—as well as a doctor, and all three turned out to be Irishmen. Sir James alluded to the odium which at that time attached itself to the office he had to fulfil, and how he went about in Ireland usually with a picture of a coffin in his pocket, but he would say that all ill-feeling had long since disappeared.

Lady Barr also acknowledged the toast and presentation, and said the great honour done to her husband made the day one of the proudest and happiest of all her life.

Eugenics Education Society.

On Friday, October 21st, a meeting was held for the purpose of forming a branch of the Eugenics Education Society. Sir James Barr, who took the chair as a vice-president of the society, in addressing the meeting, alluded to the theories of inheritance and the possibilities of improving any particular species. He went on to speak of the difficulties in the case of the human species of knowing the characters which would lead to the elevation of the race; next he showed it was much less difficult to recognize which characteristics were undesirable to propagate. The speaker recommended Dr. Rentoul's book on race culture and race suicide in connexion with the problem of preventing the increase of the undesirable elements of a population. The curing of consumption by segregation was taken as an example of the wrong method of stamping out a disease instead of destroying the breeding ground of the disease and raising a population incapable of consumption and insanity.

The Honorary Secretary of the London society explained that the practical aims of the society were to teach and apply principles especially to the care of the feeble-minded, and to Poor Law questions, to collect and analyse family histories, to investigate certain questions relating to maternity and infant mortality. It was decided to found a Liverpool branch, with Sir James Barr as the first president.

Special Service for Medical Men.

The special service in St. Luke's Church held on Sunday was a great success. There was a very large attendance of medical men, of nurses from various hospitals, and of detachments of the Territorial Medical Service—men and officers. The Bishop of Liverpool read the lessons, and the sermon was preached by the Right Reverend Francis Paget, Bishop of Oxford, on the words, "God's fellow-workers." The appeal for the Medical Benevolent Fund realized the largest amount that has yet been collected on this annual occasion, namely £42.

BRISTOL.

Conferment of Honorary Degrees.

Considerable interest was aroused by the announcement some time since that the first Congregation of the university, when it was intended to confer a certain number of honorary degrees, would be a public function, and speculations on the ceremonial to be observed and the fashions and colours of the new gowns were numerous. Speaking after the event, it must be said that the spectators—who were, of course, in greater numbers than the members of the university—were fully satisfied not only that the proceedings were dignified, but that the shape and hues of the gowns and hoods were of a colour that was sufficiently conspicuous, while not being too gaudy or crude. In short, the whole conduct of the convocation was essentially dignified, and, except for a minor detail, to be mentioned later, was decidedly a credit to those who organized the proceedings. It is not easy to devise a new procedure for the presentation of degrees. The multiplication of universities throughout the kingdom renders any strikingly new pageant an impossibility, so that, though not following the detail of any other university in every detail, the ceremony was of a very similar nature to that seen elsewhere.

Having at present no hall large enough for a public Congregation, the university took the Victoria Rooms for the evening, advertising the fact by flying the university flag on the mast over the portico during the day. Visitors, of whom a large number had been invited, were requested to be in their seats in ample time, the waiting time being relieved by a performance on the organ. In front of the orchestra the chairs of the council, upholstered in red, were ranged, facing the public, to the right of the Vice-Chancellor being the Lord Mayor, to the left a chair for the Master of the Society of Merchant Venturers. The actual procession might possibly have been better marshalled. It began with the officers of the Merchant Venturers, following them the Lord Mayor, with his special constables, the city officials, and city councillors, and after a short break the Vice-Chancellor and the university members. A striking feature was the splendid silver mace of the university, presented recently by Mr. Stanley Badock, and the two wooden staffs, mounted with silver, given by the Misses Swayne. Then in turn the recipients of degrees were presented by the Deans of the various Faculties to the Vice-Chancellor, concluding with the presentation of Professor C. Lloyd Morgan, who had been for so many years the Principal of the College and the first Vice-Chancellor. At the close the whole body of spectators joined in the National Anthem.

It only remains to mention one or two small matters. First, the colour of the hoods—in them a peculiar red was the predominant tone. Few Bristol citizens till that evening knew that there was a shade of that colour known as Bristol, but such is the case, and this has been adopted as the colour to denote Bristol degrees. It is said to take its origin from the scarlet lychnis, whose flower is of a bright scarlet colour, and described in Gerard's *Herbal* as the flower of Bristowe. How it became associated with this city is not known, but it is suggested that it was introduced to this country through the port of Bristol.

The second matter will, it is hoped, not lead to any confusion, but in conferring a degree on certain past students, the Vice-Chancellor made a verbal slip and created them bachelors of science instead of arts. No doubt the error was duly corrected in the official documents.

Thirdly, it must be said that a good deal of the dignity of the proceedings was marred by the senseless

noise of the students, who no doubt think it the proper thing to imitate the bad behaviour of this kind of other universities. In this case the discordant noises began at least half an hour before the ceremony, and continued practically the whole time, thereby preventing many of those present from hearing a word of the proceedings.

Scotland.

[*FROM OUR SPECIAL CORRESPONDENTS.*]

EDINBURGH.

Edinburgh Royal Maternity and Simpson Memorial Hospital.

MR. KEITH B. MCGLASHEN, M.B., Ch.B. (Scott Scholar), has been appointed senior house-surgeon, and Mr. A. A. Morison, M.B., Ch.B., junior house-surgeon, for the quarter beginning November 1st. Dr. J. W. Ballantyne has resigned the post of honorary secretary to the hospital, and the directors have appointed Messrs. Scott and Paterson, C.A., secretaries and treasurers of the institution.

Parish Council Observation Ward.

Dr. Martin, physician to the Parish Council on the certification of lunatics, and on incipient cases of insanity sent to the mental observation ward, reported that for the quarter ended on September 30th, there had been admitted to the ward 18 cases, while there remained under treatment at the end of the previous quarter 2, giving a total under treatment during the third quarter of 20. The "discharged," "recovered," and "improved" numbered 13, representing 65 per cent. of the total under treatment. The cases which, after observation, required to be sent to the asylum, along with those that died, numbered 5, representing 25 per cent. of all under observation and treatment. The chairman of the council, referring to the report, expressed the opinion that it was a splendid one, The results of the cases treated in the infirmary proved that the steps they had taken in this direction were wise, and if only they had more accommodation they could go on and improve this treatment.

Meat Inspection in Scotland.

On October 20th Lord Pentland, President of the Local Government Board for Scotland, and other officers of the Board received a deputation in Edinburgh to the end that throughout Scotland all meat for human food be submitted to a method of inspection and standard of adjudication to be prescribed by the Board, and that a veterinary surgeon, with practical experience in the work, be appointed to the staff of the Local Government Board for Scotland, in order to ensure the uniform observance of the system. The deputation was representative of local authorities in burghs and counties and of agricultural, veterinary, and other interested bodies. Various gentlemen spoke in support of the above idea, and in reply Lord Pentland expressed agreement with the principle, and said the Dairies (Scotland) Bill of 1909, if passed, would meet a good deal of what was wanted.

GLASGOW.

University Council.

The statutory half-yearly meeting of the General Council of Glasgow University was held in the Bute Hall on October 26th. In the report submitted by the Business Committee it was pointed out that the Council's recommendations with regard to the draft ordinance for degrees in medicine were transmitted to the University Court, and that the ordinance as adjusted by the Court was communicated to the other University Courts, and laid before Parliament at the end of July. The position now is that it is open to any University Court, or to any person directly affected by the ordinance, to give notice of dissent to the Glasgow Court within one month after receipt (that is, up till the end of October, the months of August and September being for this purpose *menses non*), and, within a month after notifying the dissent, to make a representation to the Privy Council. It is also open to either House of Parliament within twelve weeks from the date of laying the ordinance before Parliament (the period of prorogation not being counted) to present an address praying His Majesty to withhold his assent from the ordinance or any part thereof.

Royal Faculty of Physicians and Surgeons.

When last year the late King Edward granted the Faculty the privilege of designating itself the Royal Faculty, one of the most prominent Fellows, Dr. Walker Downie, made known his desire of commemorating this signal honour by presenting a mace to the Faculty. The formal presentation took place at a *conversazione* held at the Faculty Hall on October 28th, which was attended by nearly 700 ladies and gentlemen. In welcoming the guests Dr. D. Knox, the President, pointed out that though the Faculty founded by King James VI of Scotland nearly 300 years ago was Royal in its inception, it had never used the title Royal, though whether they were entitled to use this title or not he could not say. At any rate they had now received the right for all time to come to be known as the Royal Faculty of Physicians and Surgeons. To commemorate this new era in their history, Dr. Downie was gifting a mace. He then called upon Dr. Downie, who asked the President to accept the mace on behalf of the Faculty. During the evening the mace was on view, and was greatly admired. It is about 4½ ft. long, and is of chased silver gilt. After the formal proceedings were over the guests were entertained by a musical performance, and there were on view a series of specimens illustrating much of the recent advanced research work which has been carried out in Glasgow.

Hospital Accommodation for Small-pox.

The question of adequate hospital accommodation for small-pox patients in the event of an outbreak in Glasgow has again been brought to the front. It has for long been recognized that the present small-pox hospital at Belvidere is wholly unsuitable for the possible requirements of the city, both as regards adequacy of accommodation and site. Its 240 beds are on the ratio of 30 per 100,000 of the population, taking the population at 800,000, the same ratio as existed in 1877 when the hospital was built. The provision made by the Metropolitan Asylums Board, according to the report for 1903, is 45 beds per 100,000, and on this ratio Glasgow should have 360 beds. The effect of the withdrawal of the compulsory clause as regards vaccination of children has been to reduce the proportion of vaccination during infancy in the city by 15 per cent., fully 9 per cent. of which is contributed by statutory exemption, and 4 per cent. by increasing indifference on the part of those who do not even take the trouble to make the requisite declaration. In the opinion of the medical officer of health, these facts show that Glasgow is preparing a population among which small-pox may spread in a manner of which the present generation has had no experience. The situation of Belvidere is unsatisfactory, and as far back as 1902 reports on this question were submitted by the medical officer. It is too close to the fever hospital, and even to residential parts of the city. When in full use it has been shown that it tends to the propagation of the disease in its neighbourhood. During the outbreak of 1900–1901 the average attack rate for the city was 2 per 1,000 of the population, but in the districts adjoining Belvidere it was from 6 to 10 per 1,000. Of all cases that occurred from April, 1900, to June, 1901, 47 per cent. came from this adjoining area, and the proportions were the same when the recrudescence appeared the following year. Several sites for the projected new hospital for small-pox have been considered by the Corporation, and plans have already been approved by the Local Government Board in connexion with a site at Robroyston, on the Corporation estate there. This Robroyston scheme has since 1906 been in abeyance, but it is expected that

steps will soon be taken to fix the site definitely, and have a more suitable modern hospital in readiness for all emergencies.

MEDICAL AND DENTAL DEFENCE UNION OF SCOTLAND.

The eighth annual general meeting of this union was held at Glasgow on October 13th. Sir Hector C. Cameron was in the chair, and there was a large attendance of members. The Chairman, in submitting the annual report of the council, referred to the prosperous condition in which the finances of the union now stood. Over one-fifth of the invested funds was derived from the excess of income over expenditure during the past year, and the fund now stood at £1,849, which was equivalent to £1 10s. 2d. per member. He also referred to the insurance scheme, under which, for a small premium, members are indemnified against claims for damages in the event of an action being unsuccessfully defended. In view of the fact that claims against members of the medical and dental professions are on the increase, the Chairman emphasized the advice given by the council that every member of the professions in Scotland should not only be a member of the union, but should be protected by an indemnity policy. The report was unanimously agreed to, and thereafter the election of office-bearers took place.

THE LATE DR. SPENCE, BURNTISLAND.

A public memorial to the late Dr. Spence, for many years Medical Officer of Health for the Burgh, has just been erected in Burntisland. The design is in the form of a handsomely carved Celtic cross in unpolished grey granite, and stands 12 ft. high. A panel on the cross bears the following inscription: "Erected by friends in Burntisland and district to the memory of Robert Spence, M.B., C.M., born at Uyeasund, Shetland, August 8th, 1847, died at Burntisland, February 24th, 1910. For 37 years a beloved physician." In addition to the above, mural brasses with suitable inscriptions are being placed in the Town Hall and the Public Library. The memorials are the work of Messrs. Stewart McGlashen and Son, Limited, Sculptors, Edinburgh.

DEATH OF DR. BELL, SANDBANK.

Dr. Bell, Sandbank, died suddenly on the night of October 26th. Dr. Bell went to Sandbank about a year ago. He seemed in his usual health when he went to bed, but was taken ill during the night. Dr. Bell, who was about 56 years of age, leaves a widow and family.

NEW COTTAGE HOSPITAL AT ABERFELDY.

A new cottage hospital for Aberfeldy and district has just been opened. The new building is the outcome of an offer made by the late Sir Donald Currie to the hospital trustees of £1,000, and in addition half of any sum required in excess of £2,000. There are four wards, with accommodation for eight beds, and the interior arrangements are up to date.

OUTBREAK OF ENTERIC FEVER AT SALTCOATS.

An outbreak of enteric fever at Saltcoats has assumed a very serious aspect, over 60 cases are reported. The local authority has taken prompt measures to deal with the outbreak.

Ireland.

[FROM OUR SPECIAL CORRESPONDENTS.]

ASYLUM ATTENDANTS' GRIEVANCES.

THERE has been much dissatisfaction of late amongst the attendants employed in Irish asylums on the score of excessive work and deficient pay, and in consequence steps are now being taken to bring their grievances before all the members of Parliament by the issue of a circular letter. The main complaints are that the number of hours' work per day, which amount to 13½, are excessive, and that all attendants are now compelled to contribute 3 per cent. of their wages towards the pension fund. The pay for charge attendants varies from £27 to £37, and for ordinary attendants from £15 to £27 per year. As a reconsideration of the relations which exist between the local taxation fund and the Government asylum capitation grant has been promised, it is probable that any real grievances which exist can very shortly be dealt with.

VITAL STATISTICS OF DUBLIN.

Health.

The report upon the state of public health and the sanitary work performed in Dublin during 1909 has recently been issued, its appearance having been delayed owing to the prolonged illness of its author, Sir Charles Cameron. The report states that the Dublin registration area comprises 7,745 acres of land, and has an estimated population of 398,356. The number of persons residing in the whole area was in the ratio of 29 per acre, and in the city proper 38 8 per acre.

Births and Deaths.

In 1909 the births in the whole registration area numbered 11,407 (5,839 boys and 5,568 girls), which was equivalent to 28.6 per 1,000 estimated population. This rate is 0 1 above the average of the previous ten years. The deaths numbered 8,750 (4,344 males and 4,406 females), but of these 431 were deaths of persons admitted into public institutions from places outside the registration area. The death-rate was 20.5 per 1,000 estimated population, which is the lowest rate on record for the Dublin area. Of the total deaths, 3,679, or 42 per cent., occurred in public institutions, a fact which seems to show that the proportion of poor and destitute people in Dublin is very high, as in the large English towns only 18 per cent. of the deaths take place in such institutions. The death-rate from the principal epidemic diseases shows a notable decrease, being 1.6 per 1,000 as compared with 2 2 for the previous ten years. The death-rate of infants was 141 per 1,000 born, as compared with 146 per 1,000 in 1908. The present rate is, however, high compared with that of the large towns in England and Wales, which was only 118 per 1,000 in 1909. The high Dublin rate is attributed to improper and insufficient food, deficient clothing, and neglect during attacks of epidemic diseases.

Deaths from Epidemic Disease.

Since 1904 no case of small-pox has occurred in Dublin, and, in consequence, this disease does not figure in the list of causes of death. Typhus fever caused 3 deaths in 1909, out of a total of 18 cases; the deaths from diarrhoeal diseases numbered only 137, as compared with 275 in 1908; enteric fever caused 51 deaths, and diphtheria 43. In connexion with tuberculosis, attention is called to the diminished death-rate from that cause following the antituberculosis campaign inaugurated by Lady Aberdeen. During the last three months of the year the Tuberculosis Notification Act was in force, and 322 notifications were received. Notification is required in cases of pulmonary tuberculosis when the sputum is infected, provided that the individual suffering from the disease either (1) habitually sleeps or works in the same room as any other person not so suffering, or (2) is employed or engaged in handling, preparing, or distributing milk, meat, or any other article of human food intended for sale to the public.

Suggestions for Improvement of Health Conditions.

The first suggestion under this heading is to make a considerable extension of the provision of healthy dwellings for the working classes, and to clear out insanitary areas. It is suggested that a large loan should be raised for this purpose repayable in sixty years. It is to be remembered, however, that certain steps in this direction have been taken of late years, and that considerable difference of opinion prevails as to the best method for meeting the present situation—for example, in connexion with the scheme for dealing with what is known as the Cook Street area, opposition has been offered by the Dublin Citizens' Association, on the ground that it is wrong in principle to pull down the houses in part of an insanitary area,

and to rebuild in the midst of other insanitary houses. Any steps taken in providing healthy dwellings should be part of a complete and well thought out scheme.

The report also advocates the regular cleansing of the 900 streets and alleys which are not in charge of the Corporation. Several of these alleys are most insanitary; and, although the Corporation has legal powers to insist on the owners keeping them clean, the law has hitherto not been enforced. Other suggestions are: The institution of medical inspection for school children, the provision for the housing of poor consumptives still at work, the efficient carrying out of the Early Notification of Births Act and of the Tuberculosis Prevention Act, and the formation of better by-laws for the regulation of tenement houses.

Street Trading.

The report regrets the absence of medical inspection of school children; if such existed it might be possible to have the street trading children still at school medically examined to determine whether or not they were physically fit for the rough life of the streets. The establishment of a municipal nightly lodging house for young people trading in the streets is urged, as many of the children traders have no family to reside with, and sleep in ordinary nightly lodging houses.

Local Government Board Report.

(Continued from p. 486.)

Old Age Pensions Act.

The number of appeals received under this Act during the year was 21,059, and the number decided upon was 18,449. This large number is attributed to the absence of satisfactory evidence of age; to the difficulty of valuing the means of small farmers; and also to the fact that claimants who have been struck off on appeal usually come forward on the expiration of four months with fresh claims. Under the existing law, apparently every case refused on the grounds of means can come up for consideration several times a year, and as since the passing of the Act assignments of farms have been very numerous on the part of small farmers over 70 years of age, much difficulty is experienced in many cases in coming to a decision. Reference is made to the difficulties caused by judgements given in the Court of Appeal, stating that in appeal cases the jurisdiction of the Local Government Board is limited to the decision of the question that has been made the basis of the appeal.

Pauperism.

The total number of persons in the workhouses and in receipt of outdoor relief on March 26th, 1910, was 99,607. This represents an average of about 22 per 1,000 of the population, those relieved indoor being about 10, and those outdoor about 12 per 1,000. About 74 per cent. of the total workhouse population is composed of the sick, the aged, the infirm, and lunatics. Eleven additional trained nurses were appointed to the workhouse hospitals during the year, bringing the total number up to 235, as compared with 66 ten years ago. The deaths in workhouses during the year numbered 10,455, of which 1,168 were of children under 5 years of age. The total poor relief expenditure was £1,364,114.

Unemployed Workmen Act. 1905.

A sum of £9,160 was distributed to various distress committees during the year, and the opinion is expressed that by its means good and substantial work was done, and that many families were tided over the severity of the winter season without undue privation. Widening of streets, cleansing of reservoirs, clearing out old rubble drains, and reclamation of sloblands were carried out in various districts.

Vaccinations.

The number of vaccinations performed during the year was 82,046, of which 77,127 were primary vaccinations. No difficulty has been experienced in enforcing the vaccine laws, except in the Enniscorthy Union. The secretary of the vaccine department states that there is a small percentage of infants who will not respond to the most active calf lymph, and that in such cases he uses fresh humanized vaccine lymph when the consent of the parents is obtained. The humanized lymph, in his experience, seldom fails. The report from the Vaccine Institute states that the results of keeping the lymph at a low temperature (1° C) have proved satisfactory, and that it has been decided not to vaccinate calves in future during the hot weather, but to accumulate in cold storage (−6.6° C.) all the vaccine collected during the cold months of the year. The bacteriological examination of the lymph shows that, as issued, it can be absolutely relied on as pure and free from extraneous disease-producing organisms.

Midwives.

The number of midwives authorized for dispensary districts is 714, an increase of 24 in the year. It is stated that additional appointments are necessary in many other districts, in some of which unsuccessful attempts have been made to induce the guardians to take action. The death-rate of parturient women per 1,000 was 6.03 in Ireland, as compared with 4.81 in England and Wales in 1908, and in order to reduce this death-rate the opinion is expressed that further attention should be paid in this country to the care and skilled nursing of women at the lying-in periods, and consequently that trained midwives should be more universally available.

Public Health Acts.

The figures for the year 1909 show that the death-rate for the twenty-two principal town districts was 19 2 per 1,000, as compared with an urban mortality of 14.7 in England and Wales, and 16 5 in Scotland. This is the first year that the rate in Irish towns has been below 20 per 1.000. The death-rate from the principal epidemic diseases was 1.4 per 1,000. Reports dealing with the prevalence of epidemic disease throughout Ireland are furnished by the medical inspectors. Enteric fever was on the whole less prevalent than in the preceding year, though small epidemics occurred in several localities. One of these epidemics was traced to the use of water from a contaminated well, another to a creamery, and a third was definitely traced to a typhoid carrier. The epidemic traced to a carrier occurred at Kilworth Camp, near Fermoy, when 27 cases occurred. In every instance, with one exception, which could not be traced, the milk supply used by those affected was obtained from the same source; and inquiries at the dairy farm showed that the dairy maid had some years previously suffered from enteric fever. Examination of this individual's blood gave a positive serum reaction with the typhoid bacillus, and subsequently typhoid bacilli were isolated in large numbers from the urine. A complete and valuable account of the case is furnished by Professor E. J. McWeeney. No typhoid organisms were found in the faeces, and up to the present drug and vaccine treatment has failed in checking the typhoid bacilluria.

Sanitation of Naas.

Owing to a serious epidemic of scarlatina in Naas during the last few months a special committee of the Urban Council was appointed to inquire into the sanitary condition of the town. This committee has now furnished a report, which proves that the sanitation of the district is unsatisfactory, and recommends several important improvements. The rapid completion of the sewerage scheme, which has been under construction for some years, the cleansing and disinfecting of old sewers, the building of labourers' cottages, and the establishment of a public slaughter-house, are the most important structural changes advocated, but in addition attention is called to the importance of enlisting the sympathy of persons of influence in the sanitary condition of the community, in order to make the houses of the people more comfortable and wholesome. The committee believes that judicious and friendly advice and the fostering of a spirit of emulation are more likely to lead to improvement and to be popular than domiciliary visits by the sanitary authority, however necessary such visits may be.

Sanatorium for Rathdrum.

At a recent meeting of the Rathdrum Board of Guardians the following resolution was proposed and adopted:

> That the present fever hospital building be converted into a sanatorium for the treatment of poor persons suffering from tuberculosis, and that in future all cases of fever be sent to the local fever hospitals in their respective districts, and which are now partially supported by the County Council, the arrangements necessary for the transference of the tuberculosis cases, now in the infirmary, to be carried out forthwith by the medical officers, and the hospital, when renovated, be called the Ballyganno Sanatorium.

The fever hospital in question has been practically disused for some time past owing to the small number of fever cases in the district, and its conversion into a tuberculosis sanatorium is a step that might advantageously be followed elsewhere in Ireland where similar conditions exist.

Antrim Drinking Water.

At the meeting of the Antrim Rural Council on October 27th a letter was read from the county analyst to the following effect:

> I presume your Rural District Council are desirous of hearing whether the water is desirable for drinking purposes in its present condition. Those responsible for sending such samples should know better, for one was nothing less than stinking sewage, and the other was nearly as bad. Neither man nor beast would attempt to drink the water from Ballydonaghy.

Dr. Hunter reported that he had taken the water himself after pumping for some time, so that he thought the samples represented the average quality of water in the wells.

Health of Belfast.

The death-rate for the last week has been only 14.2 calculated on the English system. This is exceptionally low for this season. There are some cases of diphtheria and scarlatina, but no epidemic. Otherwise the zymotic report would be very satisfactory.

Asylum Rates in Ireland.

The inability of the Treasury to continue the capitation grant of 4s. for the Belfast Lunatic Asylum will probably throw £4,000 more on to the local rates. The grant was taken from the duty on spirits, and this has fallen so low that no balance remains.

University College, Cork.

At a recent meeting of the governing body of University College, Cork, a number of valuable gifts to the College were reported. In the first place the formal notification of the foundation of the Honan Scholarships was made, and a resolution embodying the best thanks of the governing body was ordered to be sent to Miss Honan for her most generous gift of £10,000 for the foundation of scholarships in the College. In the next place a valuable mace, which has been subscribed for by friends and old students of the college, was presented. This mace, which is a very striking example of the silversmith's art, has been made throughout in Cork in the workshop of Messrs. Egan and Sons. It is of solid silver, and stands 3 ft. 6 in. in height. The shaft and the head, which is supported by three additional wolf dogs, are adorned with Celtic ornamentation, and the latter also carries enamels—made in Cork—giving in their proper colours the arms of (1) the College, (2) Munster, (3) Cork, (4) Limerick, (5) Waterford, (6) Cashel, (7) Tralee, these being the chief cities of the counties associated with the College under the charter of 1908. The globular head thus ornamented with enamels and jewels is surmounted by a spiky crown, the traditional crown of Munster. The shaft bears the following inscription: "Me Socii et Alumni Pii Collegii Universitatis apud Corcagiam Almae Matri Suae Dono Dederunt A.D. MCMX. Bertramo Windle Praeside. Egan et Filii Argentarii Corcagienses me Fecerunt."

Special Correspondence.

PARIS.

The Birth-rate.—School Hygiene.

Not long ago a member of the Senate, Professor Lannelongue, laid before his colleagues the outline of a new law which, he hoped, would successfully grapple with the urgent question of the falling birth-rate in France. His proposal received some attention before the Senate rose, but I do not know if it will be discussed during this session. In any case, no one seems to attach much importance to it, or to expect any permanent benefit to result from it. The law has always been quite helpless in dealing with problems which are outside its own proper sphere, and has ever been unsuccessful in any attempt to regulate the inner private life of the individual. Whatever may be the influence of the ideas and actions of each one of us upon the future of the whole race, there is in them an element of individualism with which it is dangerous to meddle. With regard to such matters, prescriptions are useless and advice impertinent. The history of legislation in former times shows us plainly that neither force, nor the most indirect suggestions, nor the most tempting offers of reward have any result upon a stationary birth-rate. It is true that the law can endeavour to check the evil by such means as the reservation of public appointments for married men with children, the taxation of celibacy and sterility, and the rewarding of parents who have large families, but there should be no illusion as to the value of these methods, and their adoption should not prevent the search for the real causes of these great fluctuations of the birth-rate in different races. One reason, in my opinion, has never been taken sufficiently into consideration, and yet it is the chief root of the trouble. It seems that pregnancy and childbirth are becoming more and more formidable. It is not only a selfish economy which limits the number of children, but physical terror. Delivery by the forceps is growing more and more frequent. Even in rural districts the first confinement is often a long martyrdom, which is remembered with horror. There can be no doubt that peasant women had formerly much easier confinements; many of them got up on the third day, and started work the week after the birth of the child. Nowadays, not only is the actual delivery more difficult, but there is the added danger of consecutive injuries to the genital organs, in spite of all the precautions enjoined by modern obstetrical science. Are we to believe, with Professor Metchnikoff, that the human organism is badly adapted and ill-balanced, and in particular that the development of the encephalon is exaggerated, and the skull of the fetus is disproportionate to the pelvis of the mother? It may be so; and yet only a few years ago the majority of confinements passed off easily enough. It is obvious, therefore, that there must be other reasons for this sudden failure in our national evolution. There have been, in fact, enormous mistakes in hygiene, which necessitate a complete re-education in the art of maternity. Existence nowadays is easier for the peasant woman, and her physical labours are no longer as severe as they used to be. On the other hand, the work of women and girls of the towns in factories and shops are dangerous to their physical health and development, inasmuch as they frequently force them to remain day after day in the same attitude, making identically the same movements. Moreover, in all classes, serious mischief is done by the various freaks of fashion which, in defiance of physiology, ruin and deform such parts of the human body as should be most carefully guarded. Finally, there is no doubt that such women as will not or cannot suckle their children, do grievous harm to their reproductive powers in thus abandoning one of their chief functions. Such is, briefly, the medical side of this question of the relative depopulation of France. It is a problem of social hygiene which has to be solved. On every side people seem to

have been aroused to a sense of the importance of physical exercise; and after a passionate enthusiasm for the intellectual life, they have suddenly realized the dangers of neglecting the development of the body. A proof of this was afforded by the Congress of School Hygiene, which was held in Paris from August 2nd to 7th last, expressly for the purpose of mitigating the overcharged and complicated school curriculum, shortening the long school hours in confined school-rooms, and insisting upon the importance of gymnastics for growing children. Long ago Pascal, one of our most celebrated mathematicians and philosophers, wrote: "Who plays the angel, plays the fool." The intellectualism which causes an overthrow of the organic equilibrium is the most dangerous of all mistakes. The doctor, or rather the hygienist, is as necessary to a school as the schoolmaster himself; no one can dream of questioning the soundness of such an idea, and it only remains to regulate its general application. If, by means of a wiser education, we succeed in making a healthy nation, with its men and women sound in every bodily function, we shall have probably supplied it with a good and sufficient reason for perpetuating the race.

Correspondence.

NATIONAL MEDICAL SERVICE.

SIR,—For the disabilities of the medical profession which present themselves in quackery, hospital abuse, low fees, and bad debts, the columns of the JOURNAL have during the past few weeks contained a series of interesting prescriptions. The importance of these contributions is, however, not derived from their relation to the fundamental conditions of the problem, which they entirely ignore, but from the indications they give of a tendency on the part of a certain number of the profession to be taken by specious argument deriving its force from the individual instance. Most of the writers are following the principle which treats sleeplessness by something with a *vis dormitiva*, while Dr. Fothergill's plan may be compared to that of the doctor who tried, first from one end, then from the other, the prescriptions suitable for children given in the appendix to the book on diseases of children, and eventually fell back on the same things in a proprietary form with a Government stamp.

It is futile for the medical profession to grumble about its grievances so long as there are at one end of it men so isolated as to despise or fear the methods which would weld it into a whole, and at the other end men so poor that they must take employment on whatever terms it is offered, and at the present juncture the most important question before each of us is, "Am I prepared to stand by the majority of the profession even if its proposals should not be the same as mine?" Or, in other words, is the British Medical Association to be empowered to deal with the problem in the name of the profession, or are we to work each for our own hand?

In the danger of giving away too much to the opponents of the profession by expounding too clearly to one's friends it is evident that the facts ascertained by the Association in its investigation of contract practice have failed to attain the understanding of many of the members. There could not otherwise have been such entire oblivion of the fact that our trouble takes its root not in medical but in social economic conditions, from the existence of a section of the population "who should be enabled to provide for medical attendance by some system of small periodic payments." This fact, which the Association recognized at that time, has now developed almost into a political axiom, and no evidence has been brought forward which would throw any doubt on the statement that the kernel of the fund from which the medical attendance is to be paid for is a series of contributions per head. Are its extensions likely to be of any other character? Is it conceivable that the suggested employer's contribution will not also be of this kind—a payment per head or per pound of wages?

There remains the Chancellor of the Exchequer. His fundamental duty is to budget, and it is obvious that what we ask him to do must be subject to the conditions of due performance of this function. If any request be made to him for assistance it must take one of two possible forms: (1) An average grant to make adequate the fund for remuneration of the service of the medical profession; or (2) a grant to make up each year the deficiency left after the other funds are exhausted. We shall need a stronger lever than Dr. Grey's jointed platitudes to move any Chancellor who knows his business to grant the second.

The fund for the payment of the medical services being created by *per capita* contributions, it will in any year be a definite sum, and two problems present themselves for consideration: (1) How is the individual doctor to be paid in proportion to the services he has rendered? And (2) how is the variability of sickness incidence from year to year to be provided for? Distributing the fund by bills for attendance rendered to the individual patient is familiar, and is sometimes described as a continuance of the conditions of private practice. It does, indeed, continue the familiar mechanism, but it removes such essential conditions of present private practice as bad debts and inadequate fees. These represent in part the price which the profession now pays for its lack of union, and in part its contribution to the contingency of sickness variations. So far the only conditions on which the nation has taken over the contingencies of any profession are those of the public services. Are we likely to get the State to take over those of the medical profession on any other terms?

If provision directly from the Treasury for the yearly variations of sickness be unattainable—and so far no evidence but pious aspiration has been advanced for its probability—only two other solutions offer themselves. The first is the creation of a central reserve fund which shall accrue in healthy years and be depleted in epidemics. This fund, if created, must be in some control, medical or non-medical, and the holder will be in a position to offer terms to the profession. Those who welcome the prospect of such a fund being held either by a Government department or perhaps by the friendly societies, have forgotten the second great fact established in the Contract Practice Report—that *the evils of contract practice arise not from the contract, but from the lay control of the funds.* If, on the other hand, the margins are to be dealt with by the profession itself, the variability must be borne by a central trust or distributed among the individual practitioners.

The problem should be worked out by each trying to form a detailed picture of the conditions of his life under the two systems. Those who so completely fail to understand the principles of insurance that they find an essential difference between a hundred pounds paid for attendance on a certain group of people who have subscribed for their sickness risk according as it is paid to the doctor per head or per bill will fail to solve it, but the fact that so many who have been in good practice have recently as candidates for school work expressed their willingness to exchange practice for the dullest of medical duties under public service conditions encourages me to believe that the empiric character of the formula "payment for services rendered" will be appreciated by the majority.—I am, etc.,

Dundee, Nov. 1st. R. C. BUIST.

SIR,—The Gateshead Division held a meeting on October 27th to again consider the question of the basis on which the medical profession should be paid in the suggested State medical service.

The members were informed as to the feeling which prevailed at the Representative Meeting in favour of paying by capitation fee, but are of opinion that very many of those who voted were not directly experienced in the working of contract practice, and did not therefore realize the disaster which would result to all concerned in such an arrangement.

Nearly every member present at the meeting had much practical experience of the system known as club or contract practice, and all equally condemned the system as being thoroughly bad.

The meeting emphatically endorsed its previous opposition to such a principle, and decided to oppose it to the utmost of their power.

They very much regret that, should this policy be further advocated by the Association as being a basis upon which to work, they will feel compelled to separate from the Association.

The matter is in their opinion so important and so vital to the interests of all concerned, that after so many years of loyal and pleasant co-operation they feel they could not do otherwise than thus dissociate themselves from a policy which in their opinion would be suicidal.—We are, etc.,

Signed on behalf of the Executive. { W. J. Durant, Chairman, C. R. Stewart, Hon. Secretary.

Gateshead-on-Tyne, Nov. 1st.

P.S.—Though no vote was taken, the opinion was expressed against any principle of State Medical Service.

STATE SICKNESS AND INVALIDITY INSURANCE.

Sir,—Every credit is due to Dr. Major Greenwood for giving in plain words his objections to State insurance. As the Divisions will shortly be asked to give their decision on this subject, and as many medical men may not have had the time nor the opportunity to go fully into it, it may be of some assistance to them if I endeavour to explain why a steadily increasing number of medical men have come to regard State insurance as the best remedy for our present unsatisfactory system of medical attendance; and it would certainly clear the air if Dr. Greenwood would kindly answer the following questions:

1. Is Dr. Greenwood satisfied with the present system of medical attendance? He tells us vaguely that he is not. If not, what remedy does he propose? He tells us that he does not believe in medical attendance being included in State insurance, and apparently he is not much in favour of a public medical service or any of the proposals brought before the Association. If medical men in general are inclined to take up the same position, then by all means let us go on as we are, but let there be no more complaints. By so doing, however, that large class whose welfare the Poor Law Commission have specially considered must unfortunately still continue to suffer.

2. Does Dr. Greenwood regard the amount at present paid to medical men practising in the poorer districts as sufficient to enable them to give adequate attendance and medicine? If not, does he object to what many of us regard as quite reasonable, namely, that a subsidy should be given by the employer and the State? If the Association take strong ground there seems to be no reason why this should not now be obtained. If, on the other hand, we are content to drift, as Dr. Greenwood would have us do, an opportunity will be lost that may never recur. To those practising in the poorer districts an increase of 50 per cent. to their income might, one would think, prove acceptable, provided it could be had under reasonable conditions. If no effort is made in that direction, I again say, let there be an end of complaints.

3. I have studied the working of State insurance for a number of years, but must confess that the objections put forward by Dr. Greenwood are to me quite unintelligible. What does he mean when he says that if State insurance were introduced it would "deprive patients of the choice of a doctor altogether"? It is quite true that under the "club" system in this country the patient is often restricted in his choice. A doctor may be appointed to a club by a bare majority. The minority are bound to accept his services or do without. When a large poportion of the population is absorbed in clubs the field of practice for others becomes limited. It is also true that this system still prevails to some extent in countries where State insurance is enforced. Doctors are sometimes appointed for certain works or districts, but even in that case there is generally a choice. Against this limited form of club practice there is now, however, from medical men in these countries a most emphatic protest. In most towns and districts the patient is absolutely free to choose his own doctor. He simply keeps a note of his visits and consultations, sends in his bill, and is paid. He is not, as an anonymous correspondent would have us believe, "under the added horror and worry of official inspection by the emissaries of a heavily salaried chief." I have read the journals dealing with this subject for a considerable time past, and discussed their grievances with German and Austrian medical men—grievances, I may add, that to many of us would seem trivial—but this is the first time I have heard about official inspection. Who are these State officials? By whom are they appointed? Would your anonymous correspondent kindly answer these questions? It certainly augurs ill for the medical profession in this country if any one is to be influenced by such statements as these. The phrase "State insurance" is misleading. There is no one who knows anything of State insurance on the Continent who is not well aware that under that system the medical man no more becomes the servant of the State than the man who in return for money paid into the Post Office receives an annuity or interest from the State.

4. In what way would State insurance injuriously affect those doing contract practice? Suppose—and it is an improbable supposition—that under this system all clubs would be at once thrown open, one would scarce anticipate that all the patients would rush off to other doctors. Some would be lost and others gained, but granted even that a considerable number were lost, the medical man would be no loser, as through a subsidy received otherwise he would get larger fees. The German Association, though fighting determinedly against the remnants of the club system, has never gone so far as to ignore the interests of those holding appointments, and not only in Germany, but in this country, many of those fighting against the club system are themselves holders of clubs. They would gladly get rid of them provided they could see a way of escape. Would Dr. Greenwood kindly tell us if, after the initiation of State insurance, there were any who said they were losers?

I have of late trespassed so much on your space that I will not proceed further to point out what I regard as glaring inconsistencies in Dr. Greenwood's position. He tells us that he has no objection to the working classes being compelled to provide for maintenance during illness, but that they must not be compelled to provide for medical attendance. A strange position this to be taken by a medical man! Of course, I readily admit that in those parts of the country where the working classes pay half a crown for a visit, and there are few bad debts, there need be no great anxiety on the part of medical men for any change in our present system. Unfortunately in the great centres of population and in many districts, as we well know, the working classes now either pay nothing or an utterly inadequate fee to clubs or cheap doctors. Were all compelled to pay anything approaching a reasonable sum, the gain to the profession would be simply immense. For this reason I think the Association is acting wisely in sending down inquiries to Divisions.

There is only one respect in which I entirely agree with Dr. Greenwood. I do not suppose that State insurance for at least many years to come would relieve the country of the necessity of having Poor Law medical officers. It is admitted on all hands that many Poor Law officers are badly paid and the work sometimes badly done. The attempt to raise salaries has not proved much of a success. Nor do I suppose that under State insurance those salaries would be raised, but of this I am certain, that the work would be vastly diminished.—I am, etc.,

Greenwich, Oct. 31st. J. H. Keay.

Sir,—May I be permitted a few words in reply to Dr. Major Greenwood's emphatic letter in the Journal of October 29th? He says:

> In the interests of the community, or the medical profession, I think it would be far better that there should be no scheme of medical attendance.

The only arguments given in support of this statement are: (1) "The vested interests of the present practitioners have a right to be considered," and it would "more or less ruin the practices" of many. (2) It would deprive the insured of the choice of doctor. (3) It would be opposed by the friendly societies. (4) The State scheme, after all, might be no better than our present.

I submit that all these are arguments against a *State scheme run on contract practice lines*. If, however, the State is simply going to assist the workers to provide against the contingencies of sickness, accident, and invalidity by enabling them to insure against the cost of adequate medical attendance, there is no valid reason why this medical attendance should not, in most instances at any rate, be carried out by ordinary private practitioners and be paid for, according to work done, at a reasonable fee. In my opinion, any other system of payment is unsatisfactory, and the cost need not be too heavy.

Such a method (1) would not interfere with "vested interests," except that some practitioners who at present hold club appointments would perhaps lose a few discontents, who might, if allowed free choice of medical attendant, go elsewhere; on the other hand, the increased fees they would obtain from their other patients would certainly more than recoup them for any such loss.

(2) The patient would have absolute freedom of choice of doctor, limited only by the equal freedom of the doctor to decline any patient.

(3) I do not see why the friendly societies should oppose such a scheme; some of them have already found out its advantages. Only the most dependent class is content to be treated by "the club doctor" at present, and to my own knowledge many who are now entitled to his services prefer to go to "their *own* doctor" when they have anything really the matter, although ill able to afford the extra fees. Payment according to work done is certainly the only satisfactory method where free choice of medical attendant is allowed, as it most probably will be if any contributory and compulsory scheme is adopted. There seems to me to be no reason why the State, working in conjunction with the friendly societies, should not sanction such a scheme as that of the National Deposit Friendly Society, which has been found to work so satisfactorily in practice, and which, with very little modification, would prove acceptable to most general practitioners.

(4) The contention that such a scheme might be no better than our present seems to me to be somewhat gratuitous. We should have practically all the advantages of the present without a great many of its disadvantages. Scamped and unsatisfactory club work would be abolished; the medical attendant would know he was sure of his proper fee in every case, and would have every inducement to fairly earning it by giving of his best in his work.

It truly astonishes me that any of my fellow practitioners can fail to see what a boon such a scheme would be to us. On the other hand, if medical attendance under a State sickness insurance is to be carried out on contract practice lines, I thoroughly agree with Dr. Major Greenwood that both in the interests of the community and of the profession we are far better without it.—I am, etc.,

Bowdon, Oct. 29th. P. R. Cooper.

Sir,—In the Journal of October 29th, Dr. Cooper's letter states with great force the vital importance of holding fast to two great principles which should be most firmly maintained by the medical profession, namely (1) professional freedom; (2) payment according to work done. It is most unfortunate that the Association does not include the whole of the medical profession, so that we could speak for the whole profession. We have, however, the machinery by which we can get into touch with all. Our Divisions are able to convene special meetings, and could arrange for postal votes on *this* vital issue. At the Leicester Representative Meeting a resolution was carried in favour of "payment for work actually done." In my opinion that will be the "overwhelming verdict" of the medical profession if a postal vote be taken. In the columns of the Journal, and in personal contact with medical men inside and outside the Association, I have not found ten general practitioners who are favourable to "contract medical practice." There are two or three on the Central Council who believe the Government will never agree to the principle of "payment according to work done," and they fear that the Government will pass a "contract medical service" system which we shall be compelled to accept. But are we powerless? Can any Government compel the medical profession to accept a principle of medical practice repugnant to its principles of freedom of action and payment for work done? To ask the question is to answer it.

Our past experiences of Government treatment of the medical profession prove that we have no grounds for expecting generous consideration. At the present time we ought to bestir ourselves, and be ready to let the Government know that we are anxious to assist them in their beneficent scheme for the working classes of this country. Also, in regard to medical treatment, that we will do all that is reasonable in regard to a scale of fees based on work done. That there is a general consensus of opinion, based on many years' experience, that contract or club practice is unsatisfactory to patients and doctors. Also that there is less need for contract practice, based, as it has been, on a charitable basis, because the working classes are in a better financial position. In fact, in many of the large manufacturing towns the working classes are able to have their own family doctor and to pay the ordinary fees.

It has been said that we are "out for fees." If that means that we expect reasonable payment for work done, then we ought to maintain that position. The medical professsion can no more live on "honour" than a "baker." Both render to the State services that are necessary, and of necessity their status and well-being require reasonable remuneration.

In conclusion, I believe the highest interest of the medical profession would be best maintained if our proposed "provident medical service" and the anticipated Government "medical contract service" were thrown over.—I am, etc.,

Bacup, Oct. 31st. Jno. Brown, M.D.

Sir,—It is a wise rule that anonymous letters should be ignored, and I have some hesitation in breaking through it. But I fear that I may be in some way responsible for the unfortunate misapprehensions under which "Forewarned" labours, since I am responsible for the report of the Bristol Division meeting[1] upon which his letter is based. It is possible, however, that hurried reading has been responsible in some measure, and two minor mistakes occurring in the first four lines of his letter are obviously due to that cause. But to deal with the more important errors.

The first resolution at the meeting to which he refers was:

> That any scheme of State Sickness Insurance should be based on the principle of payment for work done, as in private practice.

This was carried by a majority of 61 to 1. "Forewarned" finds it abundantly clear from this majority that the meeting had "no confidence in the tender mercies of the Government in the matter of adequate remuneration for medical services." But the tender mercies of the Government are equally concerned whether we choose a "capitation" or "work done" system, so that his deduction is not at all clear, let alone "abundantly clear."

The second resolution:

> That it is essential that the insurance risks of such a scheme be borne by the State,

was framed with the intention of making it clear that the Division did not consider it just that any Government should lay the burden of the insurance risks of any such scheme upon the profession. Dr. Parker seconded this resolution, introducing the simile of the fly and the steam roller to which "Forewarned" objects. There was no objection raised at the meeting against the simile, used as it was used, and the resolution seconded by Dr. Parker and voted for by him was carried *nemine contradicente*. How came "Forewarned" to make the deduction that Dr. Parker's attitude did not commend itself to the meeting? Either my report or "Forewarned's" reading of it must have been very careless.

At the risk of again being misunderstood I may explain that Dr. Parker was replying to a suggestion that we should plunge into party politics and oppose all schemes of this Government because it is this Government. He pointed out that some form of State-aided medical attendance on the lines of compulsory insurance would be brought forward by a Conservative Government if the present Government did not do so; therefore to oppose on party lines the inclusion of medical attendance in a State insurance scheme was like a fly protesting against the oncoming steam roller; that we should be well advised to take this opportunity of laying before the Government the views of the medical profession as to what were the best lines upon which any such scheme should be run—best in the interests of the beneficiaries and best in the interests of the medical profession.

We could not have a better opportunity of bringing forward the principles given above and carrying the public with us, for it is obvious to every one that in this instance, at any rate, that which is in the best interests

[1] Supplement to the British Medical Journal, October 15th.

of the medical profession is in the best interests of the public health of the country.

And yet I gather from the letter by "Forewarned" that he is in favour of both resolutions. Good! I hope that when a scheme based on those principles is laid before the Divisions he will find himself able to support the scheme as well as the principles. A scheme has been forwarded by the Bristol Division to the conjoined committee for consideration, but has not been published in the Journal lest we should in any way hamper that committee. The scheme is not intended to be presented to the Government as the only possible scheme which can embody the principles passed by the Division, but solely to prove that these principles are not impracticable theories.

If "Forewarned" intended the epithets "Radical politician," "noisy," and "militant" to include the speaker whose simile he has objected to, then the epithets are quite pleasingly inept in every respect.

How is it that some of those who appeal to us for unanimity must drag in the one thing that is most likely to divide us? I am given to understand that a Conservative's distrust of a Liberal Government is only equalled by a Liberal's distrust of a Conservative Government, and since both parties are strongly represented in the medical profession, what is gained by introducing party politics and the discourtesies that seem inseparable therefrom? The game of "I spy a Tariff Reformer!" and "I spy a Radical!" is no doubt a fascinating diversion, but does it help us to secure a united profession or an amiably disposed Government?

I believe the principles and scheme passed by the Bristol Division to be such that if they are fairly laid before the Government and the public the Government will adopt those principles. And I am equally confident of success whichever Government is at the helm. But if, at the worst, we fail to convince a Government, we shall have no cause to reproach ourselves for the advice we have given, for we shall have upheld our great traditions by advising that which we believe to be the best for the public health. The fact that it is at the same time the best for the profession should not make us backward in tendering this advice.

If "Forewarned" will communicate with me I shall be very pleased to explain any further difficulties into which my hasty writing or his hasty reading of the report may have led him. The glare of publicity is at least equally distasteful to me as to "Forewarned," and I shall respect his confidence should he let slip his name.—I am, etc.,

Clifton, Oct. 31st. NEWMAN NEILD.

SIR,—We are rapidly approaching the time when the question of the attitude of the Association to the Government proposals for sickness and invalidity assurance will have to be considered, and to a great extent determined, by the Divisions. It is most earnestly to be desired that the Divisions will do nothing to justify that distrust of them which has so often, and I hope so unjustly, been expressed in certain quarters. Yet many of us know too well the difficulty of arousing the interest of the majority, even in a crisis like the present, when it is hardly an exaggeration to say that the very existence of the general practitioner is threatened. I have observed two forms of this "sleeping sickness" among medical men. In one the patient says, "I don't understand the business. It is too large and too complicated, and I have no time to study the ins-and-outs of it all"; in the other form the complaint is, "We'll have to take what comes anyhow. No Government will ever take any notice of us, so what's the good of bothering?"

Now we know, in the first place, that the Association has already made its influence felt, and will in this matter have a larger opportunity of influencing legislation than it has ever had before. Nor is an intimate knowledge of all the issues at stake necessary. Will any medical man who has been sweated, or is now being sweated, by the lay committee of a "friendly society" or a "club," contend that it is necessary for him to read through the Report of the Poor Law Commission before he can make up his mind as to whether he wishes to continue service under such or similar conditions?

That is the first and the principal question to which the Divisions will have to give a definite answer, and surely the weariness and the wounded self-respect of those who have had experience ought to determine us to demand payment in proportion to the work done, and refuse the so-called "contract" under which men have been forced to offer the whole of their time and their knowledge to each patient in return for an annual 2s. 6d.

If we, as an Association, once accept the principle of giving unlimited service for a definite annual payment, all experience goes to show that any service organized by the Government is not likely to have more consideration for its medical officers, and therefore for the efficiency of the service, than has been shown in the past by the numerous small and comparatively irresponsible bodies which have organized contract practice and found a willing beast of burden in the profession.

By his letter in the Journal of October 22nd Dr. Fothergill has done a real service to the Association. Any member who will give careful consideration to the questions there propounded will have the issues clearly in his mind, and will be in a position to record an intelligent vote at his Divisional meeting.—I am, etc.,

Leigh, Oct. 31st. FRED. E. WYNNE, M.B., D.P.H.

SIR,—On July 23rd last you had an article in the British Medical Journal entitled "Medical Attendance under State Sickness Insurance."

After reading it I wrote the following letter, and sent it to the Chancellor of the Exchequer:

Dear Sir,

In an article in the British Medical Journal of the 23rd inst. on medical attendance under State sickness insurance it is stated:

> The omission of a provision for medical attendance from State insurance would doom the whole scheme to failure from the beginning.

Again:

> Assuming, then, that medical attendance will be one of the benefits of State insurance.

Well, now, I have read all that you have said in Parliament and on the public platform on this most important subject, and I have never yet seen you make the statement that medical attendance will be one of the benefits of State insurance.

Can you say now that the assumption of the British Medical Journal is correct?

With apologies for troubling you from one of your warm admirers,

I am, yours faithfully,

I enclosed stamped addressed envelope for a reply, and I am sorry to say that up to the present moment no reply has yet been received.

You will thus see that I went straight to the fountain head for definite information, and did not get it, and the conclusion I have come to is that the Government don't know themselves yet what the provisions of their bill will be. Then why all this correspondence about nothing?—I am, etc.,

October 31st. M.B.M.A.

CONTRACT PRACTICE AND THE MEDICAL PROFESSION.

SIR,—I hope the suggestions contained in Dr. Redmond's letter in your issue of October 22nd will not be dropped.

It seems so strange to me that in a purely commercial country like England we have not had an "Incorporated Medical Society," on the same lines as the Incorporated Law Society, long ago

I am sure, if this matter is taken up by a few energetic men and that the medical practitioners of the United Kingdom pay a small subscription to meet the initial expense, the very serious condition of things could be altered.—I am, etc.,

Bamber Bridge, Lancs., Nov. 1st. R. J. LEEPER, L.R.C.S.I.

"FOR THE LOVE OF ART."

SIR,—Great interest was taken during the meeting of the Association last July in the small section of the Annual Museum which was devoted to pictures, prints, old books, historical relics, and some other curiosities.

It was a new departure, and much credit was due to Dr. Rice-Oxley, who got up this exhibition and made it

a success. His efforts were all the more praiseworthy because a very short time was allowed him to collect the materials, because too little space was allotted in the building to display them, and I must add, because by his courtesy and tact he so well overcame the many difficulties with which any one coming forward with a new idea is generally confronted.

Such a good start has now been made that I think that something more ought to follow, and I am writing to ask you, Sir, if you could use the influence of the Journal to make such an exhibition an annual affair, and whether steps might not in the meantime be taken to get up a similar one for the meeting to be held at Birmingham next July.

There must be throughout the kingdom numbers of medical men, the possessors of pictures, drawings, and engravings, both ancient and modern, which many of those who go to the meeting would be glad to have an opportunity of seeing. I might also add medical books of historical interest or autographs, as well as curious surgical instruments or other relics of the world of medicine in bygone days.

I feel certain that many of the owners would willingly lend such objects to an exhibition if they were assured that proper arrangements were made for their safety. I can say this with all the more assurance after my pleasant experience on the occasions when I have had something to do with such exhibitions and when I have seen how ready my *confrères* were to help me.

At the big *conversazione* given at St Bartholomew's Hospital for the inauguration of the new out-patient block three years ago, I got together a collection of prints and drawings of the hospital and of other objects connected with its history, and it was most gratifying to see and hear how very much the show was appreciated by the large assembly.

Surely amongst the members living at Birmingham there must be some lovers of art who, if it were suggested, would come forward and help to get up such an exhibition for next year's meeting, especially if plenty of time is allowed for them to set about it.

I write at this early date because I know the importance of having ample time, and also to say that if the suggestion meets with any response, and if any member at Birmingham cares to take up the matter, I hope Dr. Rice-Oxley will join in such an effort, whilst I shall myself be happy, *for the love of art*, to give every help in my power.—I am, etc.,

London, W., Oct. 18th. LEONARD MARK.

DRAUGHTS.

SIR,—I certainly think Dr. Torrance Thompson would have been more within the mark had he said, "In a certain proportion of cases a cold is simply the result of mental impression." One cannot get away from the fact that a cold is often caught in rooms, churches, and railway carriages from direct draughts. A continued current of cold air passing over a particular part of the body, which is imperfectly protected, extracts caloric, contracts the cutaneous vessels, and produces more or less local blood stasis, perspiration is checked and waste material accumulates. As to an ordinary head cold being due to the growth of bacteria, as Dr. Gore suggests, it seems to me to be difficult to reconcile it with the fact that 30 m of sweet spirits of nitre and 30 m of sal volatile in water repeated every four hours almost invariably stops it in from twelve to twenty-four hours.—I am, etc.,

Bexhill-on-Sea, Oct. 29th. F. P. ATKINSON.

SIR,—In the history of any movement there are times when misguided enthusiasts would force the results of progress to a premature high water mark, so that there ensues an apparent ebb, and on this tide the reactionaries launch their barques. Such times have been, and may be again, in the great movement of aërotherapy.

Some of the recent correspondence in your columns indicates how little the principles of aërotherapy are understood, even among the brethren. Thus sanatorium methods have been described as "barbarous," and windows open in all weather as a danger to the poor. The fact is that there appears to be some confusion between fresh air and draughts.

In your article of October 15th you state: "It is not commonly understood that the draught is merely the *primum movens*, the immediate cause of the ill results experienced being in some cases perhaps a micro-organism, in others perhaps a toxin, with which the system would have been able to deal effectively but for the local depression of vitality, brought about by exposure to a 'concentrated dose of fresh air.'" You have here accepted a contributor's definition of a draught as a "concentrated dose of fresh air"; and, while your position is perfectly clear to the understanding mind, I would suggest, if you will permit me to do so, that the definition is a little unfortunate, inasmuch as it implies a relation between fresh air and draughts, the distinction being one of degree.

What is a draught? I find the following statement in Notter and Firth[1]: "At 60° F. air, moving at the rate of two feet per second, is barely perceptible; at three feet it is more so; and above this it becomes a draught. At 70° F. the velocity of the air current can be even greater without being noticed." From this data we may define a draught as *a current of air, differing from the surrounding atmosphere in temperature and velocity to such a degree that a sensation of chill is produced in an individual thus exposed.* It follows that a person sitting between a fire and an open door or window is in a draught. One-half of the body is warmed, the other chilled. Resistance is lowered, and a morbific process engendered, of which the most frequent manifestation is a "cold." Such is common and personal experience. Whether the pathology of nasal catarrh be a loss of the inhibitory power of the normal secretion, as suggested by one of your correspondents, or whether it be related to an inhibition of the high absorptive faculty of the nasal mucosa and of the great lymphoid arch of the naso-pharynx, as experimental work in a wide field would seem to indicate, is an interesting yet minor aspect of the issue. My contention is that the freshness or otherwise of the air has no place in the equation. A difference of temperature is the determining factor. Thus on a mountain one may be exposed to air currents moving at high velocity, but few would designate these "winds, austere and pure," as draughts, nor would such exposure induce any morbid process.

What, then, is fresh air? "The pure atmosphere freely administered, without fear." Thus Bodington. Fresh air is indeed far removed from the very general conception of so-called efficient ventilation, based on the degree of impurity present in the respired air. Fresh air is super-aëration, in which no degree of impurity can exist, as the same air is never twice breathed. Such are the great principles of aërotherapy. For the past year I have carried out this régime at the Westmorland Sanatorium, where the patients have slept in shelters, with pure air blowing over them day and night. The dining hall is open on all sides. There are no fires, and the hot pipes have not once been on during the past year. Therefore there were no draughts. During the past twelve months, in a sanatorium of 65 beds, *there has not been a single case of "cold" or nasal catarrh.* If this be so with tuberculous patients, many of them weakened by a profound systemic intoxication, it is not too much to say that fresh air, properly administered, is devoid of danger to those in health.—I am, etc.,

HALLIDAY G. SUTHERLAND.

Westmorland Sanatorium, Oct. 25th.

FEMINISM.

SIR,—I intend to take the earliest opportunity of reading Dr. Arabella Kenealy's letter in the Woman's Supplement of the *Times*, the letter referred to in the leading article of the British Medical Journal of October 15th.

I may find reason in that perusal for modifying the views I have reached on the subject of the Woman's Movement; still I suspect I will continue to agree with the leading article in question where it states (p. 1172):

> Possibly they [the effects of feminism] are the outcome of causes which lie much deeper or date much further back than the day on which the standard of feminism was first raised.

I believe that the present degeneration of woman, upon which most biologists are agreed, has its causes in the same principle which is responsible for most of the social

[1] *Hygiene*, 6th edition, p. 31.

and political deterioration of our time—the fatal principle of equality (see my paper in the Section of Medical Sociology, BRITISH MEDICAL JOURNAL, August 20th, p. 452).

Should it, in fact, surprise us any more to find the differences between the sexes disappearing to some extent than to see, as we do, the differences between the classes—the moral, physical, and mental differences—so very appreciably suppressed?

Why cannot we learn a lesson from analogy and history? (*A propos*, is it not sadly significant that the old universities should be talking of eliminating compulsory Greek from their programmes?) Why not turn for guidance to Sparta, which produced the noblest race the world has ever seen? The women gave birth to men in Sparta. Lycurgus would have no "man-woman" (see letter from "A Plain Woman," BRITISH MEDICAL JOURNAL of October 22nd) in his system. And even Plato, who might have had some difficulty in understanding Dr. Berry Hart (BRITISH MEDICAL JOURNAL, p. 1286), knew that Lycurgus in this respect was right.—I am, etc.,

Nice, Oct. 25th. A. W. GILCHRIST, M.D.

PSYCHO-THERAPEUTICS.

SIR,—A few months ago you published a number of articles by various writers dealing with different aspects of psycho-therapeutics. I had hoped that some more influential member of our profession than myself would have been moved by their perusal to raise the question of the systematic teaching of psycho-therapeutics in our medical schools.

The field is a large one. It includes a study of suggestion in the hypnotic state, and in the hypnoidal state of Sidis; of suggestion in the normal state as carried out by Dubois; of the practice and theory of psycho-analysis, as originated by Freud, an intricate and far-reaching subject in itself; and of all the various methods by which these different kinds of treatment are made effective.

We have, besides, to consider the responses, satisfactory or otherwise, of the diverse complaints to the variously pitched appeals of suggestion, and to discuss important questions as to which methods are most applicable to different conditions, and which diseases can be treated at all by these means.

These matters cannot be made familiar except by a course of systematic instruction which ought obviously to include some general psychological teaching. If such training be still refused by our medical schools, it seems as if in the future we may have a number of medical men, who, ignorant of psycho-therapeutics, ignorant even of the nature of hypnosis, may yet start practice in this domain—a result which would certainly not only injure this particular province of medicine, but would tend to discredit the whole system of medical teaching in this country.

Is it too much to hope that even during the medical sessions of the current year the subject may receive some recognition in the teaching of our medical schools?—I am, etc.,

London, W., Oct. 26th. HUGH WINGFIELD.

THE HEARING AFTER "OTECTOMY."

SIR,—If Dr. Ward Cousins is correct as to the good results of intrameatal surgery, as I believe him to be, the opposition I have met with for so many years can hardly be justified. But surely Dr. Ward Cousins does not think that the general treatment of ear disease has been satisfactory during the past thirty years, or that the value of intrameatal treatment has been generally recognized. It is only fifteen years since I heard Professer Macewen say to an otological meeting in London, "Gentlemen, you do not cure otorrhoea." The vogue of the radical mastoid operations is not yet over. Intrameatal operations were denounced by Mr. Ballance as "dangerous and unsatisfactory," and I have yet to learn that any one but myself expressed the opinion that he was mistaken.

Mr. C. Heath wrote in the *Lancet* (August, 1906) to the effect that otologists were agreed that the only cure for suppurative otitis was a radical mastoid operation. Dr. W. Hill said, in October, 1907:

> Theoretically, I admit ossiculectomy and curetting of the tympanic cavity appears an ideal method of procedure. In actual practice, except in cases of isolated caries of the ossicular chain, it has, in my hands at least, proved disappointing.

Why this "theoretically ideal method of procedure" should be denounced as "ruthless" has yet to be explained. I should indeed be a poor creature if, in fear of ruthless criticism, I refrained from advocating a method of treatment which has proved satisfactory in so many cases, and which, if not ideal, is probably the best means of curing a multitude of cases, still too often neglected, of suppurative otitis.—I am, etc.,

London, W., Nov. 1st. FAULDER WHITE.

SIR,—May I beg a further use of your valuable space to reply very briefly to Mr. Faulder White? That gentleman, in his letter of October 17th, conveniently evades the question. I will therefore merely ask him to reply to two specific questions:

1. Will he give us the names of those "first men in the profession of surgery" who support and encourage him, together with the name of the "recognized authority in otology" who wrote to him?

2. Will he either definitely accept or definitely decline the challenge offered by Dr. William Hill and myself?—I am, etc.,

London, W., Oct. 29th. MACLEOD YEARSLEY, F.R.C.S.

THE ETIOLOGY OF SOLDIER'S HEART.

SIR,—In the very interesting discussion on "soldier's heart" at the United Services Medical Society, referred to in the leading article in the BRITISH MEDICAL JOURNAL for October 29th, 1910, the etiological factors affecting the recruit after enlistment were fully and minutely discussed. The factors antecedent to his enlistment do not appear, however, to have received quite the amount of attention they merit. There is some ground for believing, I think, that the latter are even more important than the former. Many of the recruits are young, immature, town-bred lads, probably considerably under their reputed age. Many of them come from the ranks of the unemployed, so that at the time of enlistment they are probably more or less weakened by exposure, by poor food and clothing, by lack of work, etc.

On joining the army there is an abrupt change to warm, tight-fitting clothing, a full meat diet, and active, oftentimes severe, muscular exertion. The abrupt change is bound to throw a severe strain on all the internal organs, and especially on the heart. If the organs are of average "tone" they quickly respond to the strain, and are strengthened and in every way improved by it. In youths who are highly strumous or neurotic, however, the cardiac muscle and plexus give way under the sudden strain and a condition of soldier's heart is established. In this, as in other conditions of life, it is distinctly a case of "survival of the fittest."

The essential point is that the chief danger lies in a *sudden* or too rapid strain. If, to use a military simile, the strumous and neurotic recruits were made to "mark time" until they were better fed and nourished, much of the danger would, I believe, be removed.—I am, etc.,

G. H. YOUNGE, F.R.C.S.I., etc.,
October 30th. Lieutenant-Colonel R.A.M.C.(ret.).

SIR,—In your leading article on Military Medicine, published on October 29th, you suggest that D.A.H. will be found to exist as commonly amongst the civilians from whom the soldier is drawn, as amongst the soldiers themselves, and you suggest observations by civil medical practitioners. May I point out that the information can be more easily obtained from the records which are kept by recruiting medical officers?

I am at present doing this work at Stratford, and I find that D.A.H. is exceedingly common amongst the recruits who present themselves. My recruiting sergeants have orders that they are invariably to count the pulse of the intending recruit, before they take any further steps to ascertain whether he has a probable chance of "passing the doctor." They know that I will pass a man with a pulse-rate up to 100, but not beyond.

The recruit, when first approached by the sergeant, is not in the least excited. He is very casual about the whole business, and his pulse-rate is most probably at the normal figure, and may be accepted as such. By the time

he has had a bath and enters the presence of the medical officer, excitement may have the effect of raising the pulse-rate, and in the case of an irritable heart may add twenty to forty beats per minute.

I think it is wise to accept men with a pulse of 100; for the rate may be temporarily accelerated owing to hard work and improper feeding.

From the presence of stained fingers, cigarette smoking is common amongst this class.

I believe that under the influence of rest and good food during the first month's service, the heart may settle down to the normal rate. At the same time, I think it very likely that a certain number of these cases may eventually have to be invalided for D.A.H.

For the last year or two the pulse rate on enlistment has invariably been recorded in the medical history sheet.

It would be very interesting in the future to see how many cases of D.A.H. had a high pulse-rate on enlistment. From the records of the past four years available at Stratford, I find that 24,199 recruits have presented themselves, of these 6,123 have been rejected, and of these 869 have been for heart disease. Very few of these cases have had valvular disease, and it is fair to assume that the great majority have been for D.A.H.

Up to the last three weeks the recruiters have not eliminated cases of D.A.H., and so the figures I have given may be accepted as approximately correct. During the previous three weeks my rejection for D.A.H. amount to 0.76, 1.05, and 0.71, respectively. Since they have counted the pulse the numbers have fallen to 0.22, 0.38, and 0.52.

The rejections by six recruiters for D.A.H. during the past week of pulse counting amounted to 25. As they now invariably count the pulse first, it must be understood that in the old days it would not have followed that all these cases would have reached the medical officer; many of them would have been rejected by the recruiters for other defects. The number serves, however, to show that the contention is correct—namely, that D.A.H. is an exceedingly common complaint amongst the class from which the soldier is drawn.—I am, etc.,

F. J. W. Porter,
Major, R.A.M.C.; Recruiting Medical Officer.

London, E., Nov. 1st.

THE VALUE OF THE DIPLOMA OF THE WORSHIPFUL COMPANY OF SPECTACLE MAKERS.

Sir,—A prescription of mine for glasses was taken by the patient to a sight-testing "optician and spectacle specialist," who advertises himself as holding the diploma of "The Worshipful Company of Spectacle Makers, London."

I had ordered, according to my custom, that the glasses were to be sent to me for verification, and in course of time they were sent to me by the optician. On examining the glasses, I found that the lenses were wrong; spheres had been given in place of cylinders and cylinders in place of spheres. The centreing of the lenses was grossly wrong, 10 mm. beyond what I had ordered, so that the centreing in one lens was only just on the lens. The shape of the lenses was not what I had ordered, although I had sketched the shape I wanted. The workmanship of the frames was poor, the frames so soft that they bent easily, and the cutting of the lenses was very rough.

Yet, with all these errors, the optician would appear to be so ignorant of his work that he sends the glasses to me for verification, believing them to be right.

Surely it would be better if the Worshipful Company of Spectacle Makers took some care that those holding their diploma could carry out their proper work, namely, to make spectacles correctly, than that they should endeavour to extend their sphere to sight-testing.—I am, etc.,

Rayner D. Batten.

London, W., Oct. 24th.

THE EXPERIMENTAL METHOD IN DIETETICS.

Sir,—As one who has long taken a practical interest in the study of diet by experimental investigation, perhaps you will kindly allow me to comment on the recently published record by Professor Reid Hunt on the effects of various diets upon the resistance of animals, which was the occasion of an editorial article in your columns in the Journal of October 22nd. Professor Hunt is to be congratulated on the new ground which he has broken in his investigation, and on the very important and suggestive results which he has obtained. One of his most striking conclusions has reference to the thyroid gland. His results have led him to conclude that the profound influence on resistance which he found associated with certain diets was due to their powers of stimulating the thyroid gland. This conclusion is to me personally of the greatest interest, as it is identical with one which I have previously drawn from the results of many years' investigations along a different yet closely allied line of inquiry—namely, the influence of diet on the structure of the tissues. The results of the investigations carried out by myself and others in the physiological laboratory of Edinburgh University in the past ten years have, I think, conclusively shown that diet profoundly modifies the structure of the tissues, and very specially the thyroid gland, the importance of the changes described being perhaps none the less, because their significance is as yet imperfectly understood. It was specially interesting to me to read the results described by Professor Hunt in his observations on oatmeal, since, as he himself points out, his conclusion as to the special influence of this food on the thyroid gland is in agreement with that arrived at by me from a different line of investigation, of which an account was published in your columns in 1907.

The whole subject of dietetics is at present in an interesting state. As you rightly observe, there are factors entering into the composition of food which are more complicated than its protein, fat, and carbohydrate or its caloric value, and the data now in our possession give ground for the hope that a continuation of what you have happily termed "the experimental method in dietetics" will yield results of the highest scientific and practical value. To those who have the opportunity of taking part in such investigations, I would like to point out that a vast amount of work is now waiting to be done along the following closely allied lines of research which have been initiated in recent years. These are: (1) The influence of diet on the *structure of the tissues*, as determined by the writer and his collaborators, a full record of these observations being in course of publication. (2) The influence of diet on *the bacterial flora* in the alimentary tract along lines indicated by the work of Herter and Kendall, which was specially referred to in your columns in May, 1910; and (3) the influence of diet on *the resistance to disease* (Reid Hunt).

I am confident that collective investigation of the subject along these lines would soon yield results of the highest importance to practitioners.—I am, etc.,

Chalmers Watson.

Edinburgh, Oct. 22nd.

THE PLAGUE.

Sir,—In connexion with the cases of plague in Suffolk, let me say that the Research Defence Society has lately published an illustrated pamphlet on plague in India, past and present, by Lieutenant-Colonel Bannerman, M.B., D.Sc., Director of the Bombay Bacteriological Laboratory. It gives a full account of the experiments which proved that fleas carry the plague from rats to man; it also gives a full account of Haffkine's preventive treatment, and of the many thousands of lives that have been saved by this treatment. I am sorry that the society cannot afford to give away this pamphlet in large quantities; but I shall be happy to send it to any of your readers who will send me seven stamps. I shall also be happy to send copies, on sale or return, to all booksellers.—I am, etc.,

Stephen Paget,
Honorary Secretary, Research Defence Society.

London, W., Oct. 31st.

HUNTERIAN SOCIETY SILVER MEDAL.

Sir,—The Hunterian Society awards annually a silver medal for the best essay by a general practitioner embodying the results of his own observations. May we remind intending candidates that the last day for sending in essays for the present competition is December 31st, 1910? Any further particulars may be obtained from us.—We are, etc.,

W. Langdon Brown,
A. P. Gibbons,
Honorary Secretaries.

London, W., Oct. 29th.

EXPERT MEDICAL EVIDENCE.

SIR,—*Nova et vetera* are happily united in your proposal that the scientific evidence presented to a court of justice should be that not of an individual but of a majority. I watch with the sleepless vigilance their importance demands your proposals for reform of the law, and I do not remember to have seen this one before in your columns, but the practice has the great and manifest advantage of ancient prescription. It is as old as law itself.

In the primitive courts of our ancestors trials were conducted by the method you propose of compurgation. The plaintiff produced as many witnesses as he could, who swore that his account was true. The defendant then produced his witnesses, who swore to the truth of his tale, and the matter was settled by the simple process of counting heads that you advocate. The verdict went to the side that produced the most witnesses. The simplicity and celerity of the method must commend it to all who desire to supersede the cumbrous and dilatory methods of our law by others of greater ease and dispatch; and the method you propose would have the additional advantage that the authority that selected the witnesses could secure the verdict beforehand by taking care that the majority was taken from those who took the view desired.

In the Crippen case, which suggests your proposal, the verdict would have been unaltered, for there were five expert witnesses for the prosecution, and only three for the defence; but it is evident that the unfortunate prisoner would have secured his acquittal under your method by producing three more witnesses. The blundering method of our present law requires that witnesses should not be counted but weighed, and it is satisfactory to find that the BRITISH MEDICAL JOURNAL takes the democratic view that one man is as good as another—and perhaps better. Why should the evidence of Sir Patrick Manson on a question of tropical disease outweigh that of Tom, Dick, and Harry—men of equal virtue and intelligence? Let us, as you propose, set our time by the ecclesiastical clock and return to the pure practice of the third century.—I am, etc.,

London, W., Oct. 31st. CHAS. MERCIER.

*** A note on this subject appears at p. 1455, under the title "Compurgation."

CORONERSHIP FOR CENTRAL LONDON.

SIR,—May I be permitted through the medium of your columns to tender my sincerest thanks and gratitude to the numerous members of the medical profession who were so kind as to subscribe their signatures to the testimonial on my behalf in connexion with the filling up of the vacant Coronership in the Central London Division, and to assure them of my warm appreciation of their favourable regard. Owing to their great number I regret I am unable to thank them individually.—I am, etc.,

London, S.W., Nov. 1st. LEONARD S. MCMANUS.

The Services.

DISTRIBUTION OF PRIZES AT THE ARMY MEDICAL COLLEGE.

ON October 29th Mr. Haldane distributed the prizes won at the Royal Army Medical College, Millbank. Among those present were: Surgeon-General W. L. Gubbins, Director-General of the Army Medical Service; Surgeon-General W. Babtie, Sir Alfred Keogh, and Colonel D. Wardrop, Commandant of the College. The following is a list of the prize winners: Lieutenant W. W. Treves (R.A.M.C.), first Montefiore Prize—first in military surgery; Parkes Memorial Prize—first in hygiene; Marshall Webb Prize—military medical administration; Herbert Prize for the highest aggregate; Lieutenant H. E. Short (I.M.S.), second Montefiore Prize—second in military surgery; Lieutenant R. C. Clifford (I.M.S.), Fayrer Memorial Prize—pathology; Lieutenant C. H. H. Harold (R.A.M.C.), Tulloch Memorial Prize—pathology; Ranald Martin Prize—tropical medicine; Lieutenant R. F. Bridges (R.A.M.C.), De Chaumont Prize—second in hygiene. Lieutenant Treves, who obtained four of the above prizes, is a nephew of Sir Frederick Treves.

Mr. Haldane said that not even the Admiralty possessed anything which excelled the admirable building and equipment of the college. They owed much to his predecessor, who, as Mr. Brodrick, threw himself whole-heartedly into the work of raising the Army Medical Service to a higher level. If ever Viscount Midleton wanted a memorial for his work he could find no nobler one than that building, with its equipment and the high intellectual level of those who constituted the staff. In every way the efficiency of a fighting force depended upon the work done by the Army Medical section of a military organization.

Remarkable progress had been made in the reduction of disease in the army, particularly in India. Fewer men now fell out sick in the field, and more men returned to the fighting line. There was a time when the Army Medical Service did not contribute to science in any large degree, nor was it famous all over the world as a model of what an Army Medical Service ought to be. But all that was changed, and its modern organization gave scope for every kind of talent. Names like those of Sir William Leishman and Sir David Bruce would always be associated with the bacteriological work of the Army Medical Department. Besides the field of bacteriology there was the whole field of physiology. There were the great questions of food and capacity of movement, on which to a great extent turned the efficiency of the British army, its endurance, its capacity for long marches, and the health of its soldiers. The method of physical training to-day was *toto coelo* different from the physical training of a few years ago, and they were eliminating the evil called "soldier's heart." Within the last twelve months also the War Office were able to arrange two experimental marches on Salisbury Plain which taught them what the ration of the British soldier, even under emergency conditions, ought to be, so as to maintain him in the same condition in which he began his march. That experiment cast a great deal of light upon the problem which the General Staff had to consider—how to maintain the vigour of an army in the field. The soldier's clothes also required the consideration of the physiological specialist. It seemed pedantic to talk of these things as applied to the individual, but when they were dealing with 100,000 men very slight variations produced enormous results. Therefore he commended to them not merely the bacteriological side, but also the not less important physiological side of their studies. What they needed was exact knowledge; and, if that were obtained, the money spent on equipping and maintaining that college would be saved over and over again in wastage. They had made themselves and were recognized as being one of the most important parts of the British army, and he believed still greater progress lay before them.

RED CROSS WORK IN SCOTLAND.

AT the twenty-seventh annual general meeting of the St. Andrew's Ambulance Association, a report was submitted which showed that the scope and work of this institution was steadily and continuously increasing. During the past year some 7,950 calls had been made on the wagons of the association. A remarkable increase had taken place in the number of classes of instruction conducted and examined, which now total 627, an increase of 82 over the previous year, consisting of 572 classes in "first aid," and 55 in "home nursing and hygiene." The number of certificates of proficiency issued during the year amounted to 7,602. The most important proposal at the meeting was the resolution brought forward by Sir G. Beatson dealing with the Red Cross fund held by the association. Sir George Beatson's resolution, which was adopted unanimously by the meeting, was as follows: "That a Provisional Order be applied for by the association to enable it to transfer the Red Cross Fund held by it to the Scottish Branch, British Red Cross Society, with the exception of the sum of £3,500, part of the said fund, which is to be retained by the association to enable it to carry out obligations already undertaken, including those under the sanction of the War Office." Sir George explained that the fund in question, amounting to about £9,000, was the residue left from £48,000 raised for the Scottish Red Cross Hospital at the time of the South African war. This surplus sum was made over to the St. Andrew's Ambulance Association under the obligation that it should be used for the instruction of people in work for the benefit of sick and wounded soldiers in time of war. This the association was prepared and able to undertake, but when the movement was started in 1905 to form a British Red Cross Society, it was felt better for the St. Andrew's Association to withdraw from Red Cross work to avoid overlapping by two bodies carrying on Red Cross work in Scotland. Accordingly the association loyally supported the Red Cross Society, and contributed £500 towards the formation of a Scottish branch. By their withdrawal from Red Cross work the association were left with the care of money which they were unable to use. After careful consideration it was thought best to hand over the greater portion of the fund to the Scottish Branch of the Red Cross Society, to be used for the work in Scotland under the management of the Scottish Branch, and that the Central Committee would have no claim on it. The portion still retained by the association—£3,500—was intended to meet outlays in connexion with the home hospitals reserve and the training of the St. Andrew's Ambulance Association, who could furnish the personnel of stretcher-bearers in time of war, etc.

DR. GEORGE DANFORD PHILLIPS THOMAS, Senior Coroner for the Counties of London and Middlesex, who died on August 5th, left estate valued at £3,117 gross, of which £2,588 is in net personalty.

Obituary.

PROFESSOR MIGUEL BOMBARDA, M.D.,

MEDICO-CHIRURGICAL SCHOOL, LISBON.

On Monday, October 3rd, Miguel Bombarda was shot in the abdomen by a former inmate of his asylum. He was taken with all dispatch to the Hospital de S. José, where Dr. Gentil, assisted by Drs. Feiljao and Manjardino, performed a laparotomy. The intestine had been perforated in five places. After all that was possible had been done he was carried into the ward, and a few hours later oxygen was administered. Symptoms of very acute peritonitis were, however, present, and in spite of all attempts Professor Bombarda died shortly after 6 o'clock. His assassin, Apparicio Rebello dos Santos, had used a Browning revolver suddenly during a brief interview which he had sought, after he had been absent from Lisbon for some time. His discharge from the asylum was succeeded by a journey to Paris and London, where he is said to have consulted eminent alienists. Attempts have been made to attribute a political motive to the crime, but the fact remains that the perpetrator had been within recent years certified insane.

Professor Miguel Bombarda, M.D.

A number of the members of the medical profession in this country will have good cause for sincere regret at the death of Professor Bombarda. He will be remembered by those who attended the Fifteenth International Congress at Lisbon in April, 1906, where as General Secretary he charmed all with whom he came in contact by his courtesy and practical kindness. In the report of the congress which we published, repeated reference was made to his diplomatic manner and his indefatigable efforts to make everybody welcome and comfortable. It was perhaps most noticeable how popular he had become with all the foreign members of the congress when, at the closing meeting the audience recognized with acclamation his splendid services until it could shout no more. It may be recalled that a description of his asylum—the Hospital de Rilhafolles—was given in the account which our special corresondent at the congress supplied to us.

Miguel Bombarda was born of Portuguese parents on March 6th, 1851, at Rio de Janeiro. Seven years later he came to Europe, after his father had got into difficulties with Dom Pedro IV, on account of his views with regard to the independence of Brazil. He was educated in Lisbon, and at the age of 18 was naturalized Portuguese. He entered on the study of medicine and had a distinguished career. On his graduation he gained honours for his thesis on the cerebral hemispheres and their psychical functions. This was in 1877. Three years later he gained great distinction by a publication on the dystrophies of nervous lesions. After a time, he was elected Professor of Physiology at the Medico-Chirurgical School. In this capacity he gained still further distinctions and published a number of important works.

In 1883 he, together with a few other Portuguese professors, founded a medical periodical—*A Medecina Contemporanea*. With an interruption of a few years he acted as editor of that journal during the twenty-seven years of its existence. In 1892 he was appointed Medical Superintendent of the Hospital de Rilhafolles. In this capacity he introduced many marked innovations and reforms, and many of the changes were based on what he had previously learnt in German and English asylums. In the period of his activity as the leading alienist of Lisbon he published several works of note dealing with the subjects of microcephalus, epilepsy, and the doctrine of the neurones. He was elected an honorary member of the *Academia Real das Scientas*, and served as the President of the Society of Medical Science from 1900 to 1903.

Apart from his contributions to medical literature and his valuable work on the physiology and pathology of the brain, Dr. Bombarda during the last twelve to fifteen years of his life entered the field of philosophy and politics. He wrote two books on *Conscience and Free Thought* and *Science and Jesuitism*, which gained for him considerable reputation as a powerful writer and a profound thinker. Although a Catholic his views were anticlerical, which he firmly maintained in spite of considerable opposition. He took a prominent part in the drafting of the Penal Code, and here again came in contact with the existing authorities because he, as a physiologist and respector of free thought, opposed the official who wished to deal with crime and the criminal with a ruthless and heavy hand. His book on *La folie penitentiare* created a sensation, and was powerful in introducing reforms.

In 1901, 1902, 1904, and 1907 he took a very active part in the meetings of the National League against Tuberculosis, while, as has already been mentioned, he proved himself a master of organization and of diplomatic skill in his rôle of general secretary of the Fifteenth International Medical Congress. Among the many acts which signalize his office we may mention the arrangement of the sessions at the new Escola Medica, the publication of the guides, and the organization of the conferences of the Congress as the most skilful pieces of his work.

Politically he made a reputation for himself as a Republican Member of Parliament. He was elected a member for the Eastern Circle of Lisbon in August last. In this capacity, as in his scientific and literary endeavours, he commanded the attention of friends and foes alike. His power of clear thought and his smooth eloquent tongue commanded respect from all, and his admirers were numerous and weighty.

Medicine has lost in Miguel Bombarda a man of rare qualities of intellect and character, and who will not be easily replaced. His friends and relatives have lost a fearless and true friend and a courteous and cheery companion.

JAMESON JOHN MACAN, M.A., M.D.Camb.,

CHEAM.

Less than two years ago there passed away the distinguished obstetrician, Sir Arthur Macan, of Dublin, and, as we regretfully recorded in our issue for October 22nd, his brother, and only other medical man of the name, Jameson John Macan, has now gone over to the majority. The cause of his death was lobar pneumonia, which ran a very rapid course. On October 13th he attended a meeting of the Croydon Division of the British Medical

Association at Sutton, presiding during part of the evening. He was then apparently quite well and in his usual genial spirits. The next day he was already acutely ill, and two days later—October 16th—he died. He was in the 67th year of his age.

Dr. Macan—a son of Judge John Macan, First Commissioner of Bankruptcy in the High Court of Justice in Ireland—was born in Dublin. He received his general education at St. Columba College, near that city, and then proceeded to Jesus College, Cambridge, his career there ending in his attainment of a Junior Optime in the Mathematical Tripos. He studied medicine at St. Bartholomew's Hospital, and became M.R.C.S. in 1870. He was allowed to enter for the final examination a little before his normal period of study was complete. He had suffered as a boy from spasmodic asthma, and, as it was again troubling him, it was considered that he should go abroad quickly.

As soon as he received his diploma he sailed for Australia in charge of emigrants. He returned two years later, but only to sail again for New Zealand; he did not finally take up his residence in England until 1883. Meantime he had spent three years as Resident Medical Officer at Rockhampton Hospital in Queensland, and six years or more in the emigration service. During a visit home in 1878 he became L.R.C.P.I., and on settling down in 1883 he went in for what was then a new qualification, the D.P.H.Camb., with the idea of taking up some appointment or devoting himself to institution work. Nothing, however, which seemed to him of a desirable kind presented itself, so his Australian work eventually proved the last work of an ordinary professional kind to which he devoted himself.

He by no means, however, gave up medicine, but remained a constant, though independent, student. He found plenty of occupation, for apart from his interest in science, he was an excellent musician, and had a fine voice, which made him always in request at social gatherings. In 1894 he took the M.D. of his own university, Cambridge, and meantime had translated Schultze's classical work on *Displacement of the Liver*, the translation being published with his brother, Sir Arthur Macan, as editor.

In 1897 he married the widow of the late Mr. S. C. Wilde, of Cheam House, and then took up his residence in Cheam. He was not a newcomer in the place, for an elder sister had many years previously married the rector of the parish. His married life only lasted two years, but he continued to live at Cheam.

Macan's professional occupation was of a literary kind. It commenced with the translation which has already been mentioned, and from that time onwards he identified himself with obstetrics and gynaecology. He was a good linguist and particularly proficient in German, and busied himself in translating and epitomizing papers in Continental and American journals, and in reviewing books on the two subjects mentioned. For some seven years he was editor of the *British Gynaecological Journal*, and when the British Gynaecological Society became merged in the Royal Society of Medicine he joined the editorial staff of the *Journal of Obstetrics and Gynaecology of the British Empire*.

His knowledge of the literature of obstetrics and gynaecology was very complete, and he balanced it by constant attendance at meetings of societies and clinical observation. He was also an attendant at international congresses dealing with this speciality, usually as a representative of the British Gynaecological Society.

Macan, besides being a man of much energy and industry, was endowed with a strong sense of *esprit de corps*, and more than one body had the benefit of his services. Of the Irish Medical Graduates' Association he was an active member, and at one time chairman of its council. With the British Medical Association his connexion was close and long. For many years the Croydon Division, to which he belonged, continued to return him as its Representative, and last year he was elected President of the South-Eastern Branch. Its confidence in him was again and even more strikingly shown by his election, as the Branch's choice, to the distinguished position of member of the Central Council of the Association. This was last July. In addition, he had of late years played an increasing part in the affairs of Cheam and the district, where the value of his business-like methods and attention to detail was fully recognized. He was also a keen Freemason.

We have still to speak of his connexion with the BRITISH MEDICAL JOURNAL. For many years, and indeed up to the hour of his death, he was its reporter for the Obstetric and Gynaecological Section, and no more conscientious occupant of such a post could possibly be found. He took a keen interest in his work, and devoted to its performance an endless amount of care. No man could have been a pleasanter or more reliable colleague. In private life Macan was one of the kindest-hearted of men, always ready to help with advice or personal service those who asked for it, and to many he was a most generous benefactor. If any one contrived to excite his sympathy and interest—and this was the easiest of tasks—he devoted to his or her cause the same endless care as that which he showed in his professional work.

Physically Macan was a very big man, whose equal greatness of heart was not always evident on the surface. His manner, though punctiliously courteous, was occasionally found a little alarming by those who met him for the first time. This, however, was but a momentary impression, and children, who in such matters are the best judges of all, took to him at once. Nor were adults long in discovering that underneath a somewhat heavy manner he concealed much humour and all the geniality of a typical Irishman. Macan, therefore, wherever he went was bound to be not only esteemed, but liked.

Neither Macan nor his wife were young when they married, and they had no children, but he leaves behind him two brothers—one of whom is Master of University College, Oxford—a sister, and a large circle of nephews and nieces who, with more distant relatives and many professional and private persons, now mourn the loss of a very sincere and highly valued friend.

In reference to him, Mr. CHARLES WRAY, Chairman of the Croydon Division of the Association, writes: The South-Eastern Branch of the British Medical Association has sustained a heavy loss by the death of Dr. Macan. In the Croydon Division, in which he was best known, he was held in high esteem, not only for his personal qualities, but for his masterly way of dealing with knotty points in medical politics when submitted to him as our Representative. He was a past master of detail, but an uncompromising enemy of hot-headed iconoclasts. The main object of his latter years was to do all he could to extend and consolidate the influence of the Association. He succeeded John Galton, a strong man, and many were the misgivings of some of us when we saw Dr. Macan step into his place, but in a very short time he proved a worthy successor. His solicitude for the best interests of the profession was at his heart, but never on his lips save when words were as urgent as deeds. One may truthfully say that every man in the Division who knew him personally feels he has lost a sterling friend. Many of us have seen him stern to a degree, but the sternness was because at the moment he dealt not with men but with principles. There are some who think that the tone of the profession is from those who fill important chairs in our schools, but long experience has convinced me that representative men like Galton and Macan make a deeper impression for good on the younger members of the profession than is realized. Such men we can ill afford to lose.

HENRY COLLEN ENSOR, M.R.C.S., L.S.A.

MR. ENSOR, who died recently, was the son of the late Mr. Thomas Henry Ensor, Solicitor, Cardiff, and a brother of the present prosecuting solicitor to the Corporation, and was born at Cardiff on May 2nd, 1859. He received his early education at Milton Abbas School, and, having matriculated at the London University, he entered Guy's Hospital in the summer session of 1879, and passed the Preliminary Scientific and the Inter. M.B., taking the M.R.C.S. and L.S.A. qualifications in 1885.

As a student, painstaking and thorough in his work, he was early recognized as a man of marked ability, and if, as a result of independent thought and judgement, he held firm convictions, he was always careful in arriving at his conclusions to give proper consideration and attach due weight to the opinions of others. He held the higher

student's appointments, and amongst them those of Ophthalmic Surgeon's and Aural Surgeon's Assistant. Of a modest demeanour, unobtrusive, and retiring in disposition, he was yet open-hearted, sympathetic, considerate for the welfare of others, and imbued with an integrity of purpose which was inspired by the noble ideals of his profession. He was naturally, therefore, highly esteemed and his friendship valued by a large circle of students. His health, never robust, compelled him, after obtaining his qualification, to relinquish the further course of study for his final M.B. Deciding to take up the practice of ophthalmic and aural surgery, he became Resident Surgeon at the Birmingham and Midland Counties Eye Hospital, and ultimately settled, in 1887, in Cardiff, his native city, where he quickly established a large consulting practice, becoming Ophthalmic Surgeon to the Cardiff Infirmary, the Cardiff Provident Dispensary, the Cardiff Deaf and Dumb Institute, and the Cardiff Eye and Ear Hospital. He was Captain on the Special Hospital Reserve of the R.A.M.C. Territorial Regiment.

He was a prominent and enthusiastic Freemason, and held offices of the highest position in the craft and chapter; and he also associated himself actively in charitable objects and philanthropic institutions. His death, which occurred on August 23rd, at a comparatively early age, is a loss keenly felt and deplored by a large circle of friends, many of whom have experienced at his hands acts of kindness which will always make them feel debtors to his memory.

Mr. D. Leighton Davies, M.D.Lond., F.R.C.S.Eng., Demonstrator of Anatomy, University College, Cardiff, writes: By the sudden and unlooked-for death of Mr. H. C. Ensor, South Wales has lost one of her most esteemed practitioners, and his death is lamented by a wide circle of friends and patients. Of a quiet and unostentatious nature he yet contrived to get through a large amount of useful work. He was very thorough in all he undertook, even to the minutest details. In his professional work one could not but be struck by the readiness with which he fell in with the newer ideas of pathology as applied to ophthalmology, and he was always ready and interested by new suggestions for treatment. As an operator he was possessed of very considerable skill, and was, withal, rapid in execution, and he therefore met with a great deal of success in this part of his work. He never shirked work, and died in harness, for he was operating at the infirmary on the day of his death. He was a man of large heart and generous nature, ever ready to stretch out the right hand of fellowship to those who desired his friendship. His patients found in him not merely a physician but a real and true friend, and many will be the number of those (of whom the writer is one) who can recall little acts of kindness done in secret. The world is better for his life, and he will live in the memory of his friends. May he rest in peace!

We regret to announce the death of Dr. Lancereaux, formerly Physician to the Paris Hospitals, and President of the Académie de Médecine.

We regret to report the death of William Francis Manners, M.A.Camb., M.R.C.S.Eng., L.S.A., which took place on August 17th last at Degema, Southern Nigeria, after a brief illness. Mr. Manners, who was the eldest son of the late Colonel Manners, of Newport, I.W., was educated at Cambridge and St. Thomas's Hospital, and was in practice for some time at Claygate, Surrey, and Pewsey, Wiltshire. In 1902 he joined the West African Medical Service, where he was held in the greatest respect by his colleagues and the native population, so much so that certain prominent natives in Bonny are proposing to erect a memorial to his memory. Mr. Manners leaves a widow and three children.

Surgeon-Colonel Francis Henry Welch, F.R.C.S., retired Army Medical Staff, died at Southborough, Kent, aged 70. He entered the service as an Assistant Surgeon, April 1st, 1861, and became Surgeon-Colonel in 1892, retiring in 1895. He took part in the Hazara Expedition in 1888, and was mentioned in dispatches. He was awarded a gold medal in 1860 while a student at the London Hospital, and in 1873, and again in 1882, he gained the Alexandra Gold Medal. He was a Professor of Pathology at the Army Medical School from 1871 to 1876. He was a voluminous writer on subjects incident to his profession, more particularly as connected with the army.

Medico-Legal.

MARKHAM *v.* WOOD-ABRAHAMS.

Before Mr. Justice Ridley and a special jury, in the King's Bench Division, on October 24th, 25th, and 26th, Miss Margorie Helen Markham, 23, an ex-university student, of "Glion," Moreton Road, Croydon, claimed damages from Mr. R. Thomas, a qualified optician, trading as "Wood-Abrahams, Eye-sight and Spectacle Specialist," Manchester, for injury to her sight through his alleged negligence in supplying spectacles and examining and testing her eyes.

Sir Frederick Low, K.C., and Mr. Greer appeared for the plaintiff; Mr. McCall, K.C., Mr. Albert Profumo, and Mr. Leach for the defendant.

In his opening speech, Mr. Greer said that the plaintiff was practically on the verge of blindness. At the time of consulting the defendant, in September, 1907, she was studying at Aberystwyth College for the final examination for the University of London Science Degree, intending to become a teacher of science. He treated her for astigmatism, and supplied her with two pairs of spectacles, one specially for reading, one for ordinary use, while, as a matter of fact, the trouble was conical cornea. This, the defendant, if reasonably skilful, ought to have noticed at once, and advised her to consult an oculist.

Miss Markham then went into the witness-box and described the tests her eyes were subjected to on her visits to the defendant's shop in 1907, 1908, and 1909. She thought she was receiving skilful and careful treatment.

Cross-examined by Mr. McCall, she said that from 1903, when she matriculated, up till 1907 she studied five or six hours a day on an average.

Re-examined, she said her eyes improved after using the glasses prescribed by Mr. Wray in 1909.

Mr. Charles Wray, F.R.C.S., Senior Surgeon to the Western Ophthalmic Hospital, was called next, and stated that Miss Markham came to him in November, 1909. She had conical cornea. In the early stages it was a slowly progressive disease, but as soon as the conicity was measured by a +8 spherical it rapidly became dangerous, especially if the patient should fall into bad health or be deprived of sleep. He was of opinion that Miss Markham must have had conical cornea for about eight years. It was an easily discoverable disease. Had an ophthalmoscope been used with ordinary care, it would have been impossible not to have detected it. The spectacles supplied by Mr. Thomas were altogether too weak to cope with the disease. She should have been told at once, continued witness, to change her occupation and cease reading. Study increased astigmatism and hastened the end.

Sir Frederick Low: In your opinion what would be the end?

Mr. Wray: There can be but one end, and that is, she will certainly lose the sight of one eye—probably both.

That, he said, was attributable to improper treatment. Had proper treatment been given in the incipient stages, the progress of the disease could have been arrested and the sight of one eye certainly saved for distance.

From November of last year up to the present time the dioptre of astigmatism of the plaintiff's eye had increased about 1½. The glasses prescribed by witness were 7 dioptres, nearly double the strength of those supplied by Mr. Thomas. By doubling the strength of the glasses the strain on the eye was diminished. Mr. Thomas had underestimated the dioptre of astigmatism. So far as glasses were concerned, Miss Markham was now in the last stage of helpability.

Cross-examined by Mr. McCall, Mr. Wray explained that for some years past he had taken a very strong view against opticians prescribing spectacles at all. That was the duty of an oculist.

Mr. Justice Ridley: Does that mean if people want a change in glasses they must go to an oculist?

The Witness: It is prudent, my lord, and, if I may suggest it, this case proves it.

Replying to Mr. McCall, witness said he had frequently expressed that view. He even went the length of saying that every optician should be a qualified oculist. It was impossible to say that conical cornea was a congenital disease. It occurred in 1.5 cases out of every 1,000. It was incurable. All that medical or surgical skill could do was to retard its progress by means of suitable glasses.

Mr. Nathaniel Bishop Harman, F.R.C.S., ophthalmic surgeon practising at 108, Harley Street, followed. He examined the plaintiff on January 24th of this year, after she had been treated by Mr. Wray, whose evidence he corroborated in every essential particular. Miss Markham, whose health was by no means robust, ought not to have been allowed to endanger her health in the unwholesome atmosphere of lecture rooms and laboratories. If the dioptre of astigmatism increased beyond 8 it was impossible to prevent it going further.

The plaintiff's case concluded with the evidence of the Rev. Arthur Markham, her father, who described his visits to the defendant's shop in Manchester.

Mr. McCall, addressing the jury on behalf of the defendant, said that in substance the action was brought against an ordinary tradesman because he did not possess the skill of such eminent oculists as Dr. Wray and Dr. Harman of Harley Street. It was unheard of. The plaintiff's business was to sell glasses which would improve the sight of the chance customer who came in, not to diagnose obscure ophthalmic diseases.

Mr. Luther Ensor, defendant's assistant, said he adopted the subjective method in testing Miss Markham's eyes. He did not use an ophthalmoscope, but may have used a retinoscope.

Mr. Thomas then gave evidence. He also tested the plaintiff's eyes by the subjective method in April, 1909, and found they were very astigmatic. There had been no great change since she first came to his shop.

In cross-examination he said he frequently sent cases to the hospital.

Then came the three expert witnesses for the defence—Mr. Hartridge, Dr. Stephenson, and Dr. Ettles—who all admitted that the plaintiff had conical cornea; but emphatically denied that she was now nearly blind or that she was in danger of blindness. Conical cornea, in their opinion, was exceedingly difficult to detect in its incipient stages, even by a highly skilled oculist, and the disease in the plaintiff's instance could not have been aggravated by the glasses.

Summing up, Mr. Justice Ridley said there was no evidence at all to show that the defendant was required to bring to bear in this case the same degree of skill and knowledge that a doctor or a surgeon was expected to do. In the matter of the eye, as in the matter of the body, there were many complaints which did not require the treatment of a skilled doctor. The chemist who sold a box of pink pills did not warn his customer that they were not the proper things to take. The real question was, Ought Mr. Thomas to have discovered the existence of conical cornea in the plaintiff's eye?

The jury disagreed and were discharged.

PROSECUTION UNDER NOTIFICATION OF BIRTHS ACT.

IN the JOURNAL of October 22nd were reported two cases in which mecical practitioners were fined in small sums for breach of the Notification of Births Act. We have now to report additional cases in which, however, the prosecutions failed—the defence in these cases being conducted by the Medical Defence Union.

From the Bradford *Daily Argus* we gather that Drs. J. F. Allan and W. P. Dunsmore were on September 6th summoned for not complying with the Act in question, in that they failed to notify within thirty-six hours, although in attendance upon the mothers of the newly-born within six hours. A post-card had been issued by the Health Department of Bradford to medical practitioners in the district stating that the "duty" of notifying a birth to the Medical Officer of Health devolves in the first instance upon the *father* of the child, if he be living in the house at the time of the occurrence of the birth; and if not, then upon "any person in attendance upon the mother at the time or within six hours after the birth, etc."

After the post-card having being put in as evidence the stipendiary intimated that this was a sufficient exoneration. The solicitor acting for the Medical Defence Union, however, claimed that a ruling on the interpretation of the Act should be given. He urged that unless it was construed very literally the result would be absurd, as several people might be fined for omitting to notify one child, and a daughter or a neighbour giving assistance at the time would come within the scope of the Act.

The stipendiary then stated he would give his decision on October 11th.

The judgement has now been given, and, as it is important to the profession, we make the following quotations from it. After giving a history of the facts, the magistrate stated:

"The local authority, with a laudable motive of making the clear meaning of the statute still more clear, had caused to be printed on the postcards . . . what purported to be either a copy, or an abstract, of the material provision. . . . The substitution of 'or' for 'and' of course completely misrepresents the effect of the Act of Parliament; and at the close of the case for the prosecution I intimated my view that the court was prepared to dismiss the summons on the ground that the issue of the postcards in that form constituted extenuating circumstances within the meaning of the Probation Act.

"Mr. Belden, however, who appeared for the defendants, instructed, as he informed me, by the Medical Defence Union, desired my opinion on another point, and therefore called the defendants as witnesses.

"The point taken that the duty of notification lies primarily upon the father of the child, if residing in the house at the time of birth, and that this circumstance alone is sufficient to bring the medical man in attendance within the terms of the above-mentioned proviso, and to give him reasonable grounds for believing that some other person—namely the father—had given the prescribed notice. I am quite unable to appreciate this argument. The statute contains no warrant for it, and the only thing that can be said for it is that by some mischance it appears temporarily to have imposed on the local authority. The only doubt I have is whether, in view of the evidence of the defendants, that the failure to notify must have been the result of forgetfulness. It is not the duty of the Court to convict, but upon the whole it appears to me that it would be harsh to inflict the penalty upon the defendants for not doing what the local authority had told them they need not do; and accordingly I dismiss the summonses. It must be taken, however, for the future that the effect of these post-cards, which I assume have been withdrawn from circulation, is exhausted."

This decision makes it quite clear that the only possible chance of success in defence in this respect is that a medical practitioner has reasonable grounds for belief, such as will satisfy the magistrates, that some other person has duly notified; and this, we assume, is the common sense, as well as the legal, interpretation of the Act.

The safety against prosecution lies, therefore, in either notifying, or amply assuring oneself that someone else has notified, the birth within the required time. Outside such safeguards danger lies, and it will be for the medical profession to secure immunity by these methods.

THE ANTIVIVISECTION HOSPITAL.

THE *Times* of November 2nd contains a report of an inquest held at Battersea on November 1st by Mr. John Troutbeck on the body of a child named Robert James Wright, son of a soldier stationed at Chelsea Barracks. The child, aged nearly 10 months, while at an aunt's in Bullen Street, Battersea, was seen putting a piece of coal to his mouth. He was suddenly taken ill, and as it was feared he had swallowed some coal his uncle, a 'bus conductor, rushed off with him to a doctor, who advised the patient's removal to the Bolingbroke Hospital. The uncle, being almost exhausted, handed the child to a neighbour, a Mrs. Davis, who got into the first tram that came by with the intention of taking the child to St. Thomas's. The child gasped so that she changed her mind and went to the Antivivisection Hospital, which is not far from Bullen Street. The institution is now known as the Battersea General Hospital, but it was explained at the inquest that it retains the name of the Antivivisection Hospital in order to be entitled to certain legacies. The evidence of the relatives differed in some points from the medical evidence. Mr. MacCormac, assistant medical officer of Wandsworth Infirmary, said he first heard of the case by telephone from the Antivivisection Hospital. The sister there gave him a message on behalf of the doctor to the effect that they had a child at the hospital which required tracheotomy. In answer to a question whether it was diphtheria, she said she did not think the doctor quite knew, or something to the effect. There was no mention of coal. The child was admitted practically dead. The witness immediately performed tracheotomy in the kitchen of the receiving ward, and the patient recovered. Afterwards, however, he developed pneumonia, and died on the night of October 29th. On making a *post-mortem* examination the witness found a piece of coal nearly an inch square jammed in the voice box. This, in his opinion, had brought about the pneumonia. A heroic operation would have been necessary for the removal of the coal. From the first the child had very little chance, and it would have made no difference if tracheotomy had been performed two hours earlier. He performed the operation single-handed.

Dr. Gott, resident medical officer at the Antivivisection Hospital, said he could detect no foreign body. To the sister he mentioned the possibility of various diseases but not to the relatives. He ordered a hot bath and a mustard poultice, and, in view of the history of the case and having no bed, he thought it best to get the child into a public institution other than his own. The sister suggested the infirmary and he agreed. He did not know the sister said instant tracheotomy, or that tracheotomy was necessary. The child was kept at one temperature, and every care was taken of him. He thought the best treatment was to send him to a public institution where they had more available appliances. If he had telephoned for assistance perhaps it would have come not quickly enough. The coroner said that there was no evidence to suggest that the absence of treatment at this general hospital accelerated the child's death. There should be some explanation as to why the case was removed from a general hospital to the infirmary. It was difficult to understand the story of the child's reception and treatment at and his removal from this general hospital. The jury returned a verdict in accordance with the medical evidence, and came to the conclusion that the coal was swallowed accidentally. The foreman added: "The jury do not appreciate the action of the Antivivisection Hospital authorities."

A MEDICAL HERBALIST.

AN inquiry regarding the death of a woman, who died under the care of a herbalist, was held last month at North Mills by the coroner for the High Peak district.

The general evidence was to the effect that the deceased, a woman aged 47, had been sent home to North Mills from her situation at Sale on account of her health. She had a cough and had had haemorrhage from the lungs, which had soon subsided under treatment. On returning home she remained well for a time, but eventually put herself under the care of a medical herbalist, and apparently some two or three days later had a violent fit of coughing, brought up much blood, and died almost immediately. It was also stated that the medical herbalist when called in by the patient's friends at her request said that if the patient grew worse they should send for an ordinary medical man.

The medical herbalist, giving evidence, said that he had supplied the deceased with two bottles of medicine; one contained comfrey, marshmallows, and witch hazel tincture; what the other contained he did not know. It was a mixture for the stomach which he got wholesale. It contained, he thought, wild cherry bark.

The medical man, Dr. Chapman, who was called in after the patient's death, said that he had seen the medicine which was said to be "for the stomach," but as it had not been analysed he could not say what it contained. It might, as far as he knew, contain strychnine. With regard to the other mixture, he could only state that it was wrong to give anything containing a cardiac stimulant to a person suffering from pulmonary haemorrhage.

The coroner, after stating that the final end of the patient was exactly what would be expected in a case of pulmonary phthisis, completed his summing up by the following remarkable statement: The case was somewhat complicated by the fact that while at home deceased had seen fit to consult Mr. Howard. He was not a qualified doctor, and did not profess to be. He was a medical herbalist. He (the coroner) did not want to condemn Howard off-hand—nor must the jury—because he was not a qualified medical man. There were men with a large amount of knowledge who were not qualified medical men, who treated people to the best of their skill, and, unless it was shown they were absolutely wrong, it was not for him or the jury or anybody else to condemn them. One bottle was intended for the cough, and its ingredients were more or less used in all cough cases. One of the constituents Dr. Chapman did not think advisable for a particular reason, but that was a long way from saying that it was the cause of death. The second bottle was intended for the stomach; but that did not seem to him to be quite in the question. It would not necessarily contain anything deleterious. They had Howard's statement as to what the bottle contained, and they had to say whether they accepted that statement. If they thought that Howard gave the bottles in the full belief he was giving something to give relief, and that there was nothing harmful in what he did, then it did not call for attention at the jury's hands. If they thought Howard was wrong in what he did, and acting on insufficient knowledge and advice, gave her something which did her harm, then they would say he was to blame. Nothing but a careful analysis would show what the bottle contained, but there was no reason to suspect that Howard was telling them anything wrong. There was no question as to the facts of his statement so far as that went. Apart from Howard's attendance upon the deceased, it was a straightforward case of pulmonary haemorrhage. They must consider the fact of Howard's attendance upon her, and if they thought that did harm they must say so. If they did not think Howard's attendance was a material fact, it was no matter of theirs, whatever it might be for a medical council or any body of that kind. If the jury wished, he would, of course, have the contents of the second bottle analysed.

In view of this curious deliverance it is scarcely strange that the jury promptly returned a verdict that death was due to pulmonary haemorrhage without any comment on the circumstances disclosed.

WORKMEN'S COMPENSATION.

Alleged Inoculation of Tuberculosis from a Cow.

A CASE in which it was sought to prove that a man had contracted bovine tuberculosis occupied the attention of Judge Tindal Atkinson at the Ilford County Court on October 22nd. The plaintiff, Thomas Stringer, residing at Barkingside, near Ilford, was employed by Messrs. Prentis and Son, greengrocers, etc., of Ilford, to look after some cattle, and it was alleged that whilst attending a heifer, which was suffering from tuberculosis, Stringer became inoculated with the bacillus, which found its way into a wound caused by a "chap" between the thumb and first finger. The claim was made under the Workmen's Compensation Act, and Dr. Murtaugh Houghton sat with His Honour as medical referee.

From the statement made by Mr. Foden Pattinson, who appeared for the plaintiff, it appeared that Stringer, acting under the direction of a veterinary surgeon, who at the time only suspected bronchial pneumonia, gave the heifer bran mashes, which he mixed with his hands, and also administered a "drench" by means of a bottle. He also had to clean out the trough with his hands, and this trough invariably contained a quantity of saliva after the heifer had been in the shed during the night. It was at the end of January last that he commenced to do this, and about the same time he had a "chap" on his hand between the thumb and first finger, and his case was that Stringer was inoculated with the tubercle bacillus whilst attending to the heifer. Up to that time Stringer, who was 65 years of age, had never had a day's illness in his life, but after attending to this animal—which was slaughtered and found to be extensively diseased—he developed consumption, and was now in the last stages of the disease. In March he became so ill that he had to consult Dr. Percy Drought, and eventually had to give up work altogether: hence the claim under the Workmen's Compensation Act.

The plaintiff, who was scarcely able to speak, briefly corroborated the main facts of counsel's statement. A cough had developed, lumps appeared on his arm, he sweated very badly, and when he went to the doctor he was told he was suffering from consumption.

Plaintiff's wife and a local builder who had known Stringer for several years gave evidence showing that the man had enjoyed good health prior to January last, when he attended to the heifer.

The veterinary surgeon, Mr. Walter Grey of Ilford, said he was of opinion at first that the animal was suffering from bronchial pneumonia, and as it did not make any progress he ordered it to be slaughtered. He had no suspicion at first as to the existence of tuberculosis.

Evidence was next given by Frank Palmer, of Brentwood, who slaughtered the animal and found "bunches of grapes" inside the carcass. He recognized this to be tuberculosis, as he had killed many animals suffering from the same disease. Witness did not pretend to possess any scientific knowledge on the point.

Dr. Percy James Drought said the plaintiff came to him on March 28th last. He was suffering from consumption, and witness detected a cavity in one of the lungs. He was told of the work which the plaintiff had been doing, and he thought it quite possible that the man had been inoculated through the wound caused by a "chap."

The Judge: Is it possible that a man can contract consumption from a cow?

Witness: It is.

The Judge: Is that definitely agreed now by all experts?

Witness: I cannot say by all experts, your Honour. It is my opinion.

Answering Mr. Shakespeare, who appeared for the respondents, witness said if the inoculation was sufficiently acute it might attack the whole system, and not remain purely local. The wound where inoculation took place might heal and get perfectly well, but the lungs might be affected. Usually they expected to find a scar of a distinctive character at the point of inoculation. He did not suggest that there was such a scar upon this man's hand.

Mr. Shakespeare: If a man becomes inoculated on February 7th, could the disease possibly progress so rapidly that the lungs would be affected by the 14th, and the man would have a cough, night sweats, spit, and suffer general lassitude?

Witness: The bovine tuberculosis is exceptional, but I do not think all those symptoms would be present within fourteen days. Continuing, witness said, in his opinion, it was quite conceivable if the disease had made that rapid progress in fourteen days, that the man would be alive now. There was a cavity in the man's lung when he saw him in March; he would not have expected this in a month.

Replying to the judge, witness said there was nothing in the surroundings to show that the man had contracted consumption in any other way but through this cow.

Dr. James Edward McCausland gave it as his opinion that it was quite possible for human beings to contract tuberculous disease through inoculation from a cow. He had examined the plaintiff and found the right lung extensively diseased. It was unusual for persons of 65 to contract consumption in the ordinary way.

Witness was asked whether he agreed with this statement which appeared in the BRITISH MEDICAL JOURNAL: "We are not aware of any cases of human phthisis which have been conclusively proved to be due to cutaneous infection with bovine bacilli." He replied that he had never met with a case, but he knew a surgeon who was inoculated with tuberculosis in his hand.

For the defence Dr. J. Charlton Briscoe, of 110, Harley Street, Assistant Physician to King's College Hospital and Physician to the Evelina Hospital for Children, said he examined the plaintiff on September 16th. There was a faint scar at the point where inoculation was said to have taken place. There was also a cavity in the upper part of the right lung and a consolidation of a part of the other lung. He did not consider it possible that the man could have been inoculated as alleged. If it had been so, there would have been an enlarged gland in the armpit, the lungs would have been affected to a smaller degree, there would have been signs of infection in the other organs of the body, and the wound would not have healed up so quickly. Cases of inoculation were extremely rare, and six months or a year usually elapsed before the symptoms declared themselves. In cases of inoculation of this description, there would be a distinctive scar.

The Judge said the two points he wanted to be assured upon were these: Could the cavity in the man's lung which was discovered on March 28th have existed before January? Did the scar show any indication of inoculation at that spot?

Dr. Briscoe said the cavity must have been there before January, and as for the scar, it was not one which he should expect after inoculation.

Dr. McClure gave corroborative evidence, and after a hearing which lasted six hours the Judge said: Although the general circumstances seemed to point to the probability of the man's story, he was convinced that the disease was of much longer standing than was alleged. The question of the cavity in the lungs as early as March, and the absence of any distinctive scar at the alleged point of inoculation, also weighed with him, and then there was the extreme rarity of such cases. Whilst commiserating with the plaintiff, he felt bound, on the evidence, to give judgement for the respondents.

TRAVELLING EXPENSES IN INQUEST CASES.

A CORRESPONDENT asks why medical men are not allowed travelling expenses in inquest cases when all others are.

*** The payments to medical witnesses at inquests are governed by Sect. 22 of the Coroners Act of 1887, which do not include travelling expenses. We are not aware that other witnesses have advantages over medical witnesses in this respect.

FEES FOR SURGICAL OPERATIONS.

A CORRESPONDENT asks whether there is any recognized scale of fees for surgical operations. He was called to the wife of a gentleman holding an official position and residing in a house rented at £50 per annum, after an accident, and had to ligature the ulnar artery, suture the ulnar nerve, and some of the flexor tendons. What fee should he charge?

*** If our correspondent was the medical attendant throughout, it would be reasonable to charge a fee of five guineas for this item. If he were specially called in to do this operation by the medical attendant in charge he might claim a higher fee. We do not know of any special scale of fees for operations. They vary in different parts of the country, and the custom of the particular district should be followed.

Medico-Ethical.

The advice given in this column for the assistance of members is based on medico-ethical principles generally recognized by the profession, but must not be taken as representing direct findings of the Central Ethical Committee, except when so stated.

PROFESSIONAL ETIQUETTE.

X. Y. Z.—On the facts as stated to us B. appears to have no ground of complaint.

G. P.—*(a)* We should regard it as intolerable impertinence for a medical man to go to another practitioner's house to "insist" on attending to an accident that had been taken there, and which was already receiving attention. While it would be natural and right for any one who knew that a patient of his had met with an accident to ascertain that he was receiving due attention, there should be no question of "insisting" upon a right to interfere. *(b)* We have repeatedly expressed our disapproval of medical practitioners giving assistance to opticians who advertise to correct refractive errors. Medical practitioners are not allowed to advertise themselves, and they must not cover those who do, or they may thereby render themselves liable to censure.

Public Health.

HANDBOOK ON MEAT INSPECTION.

A CORRESPONDENT asks what is the best small handbook on meat inspection suitable for sanitary inspectors.

*** Any of the following would be suitable for the purpose: Vacher's *Food Inspector's Handbook* (The Sanitary Publishing Co., London. 7s. 6d.); Macewen's *Food Inspection* (Blackie and Son, London. 5s.); Walley's *Meat Inspection*, by Stockman. (Green and Sons, Edinburgh. 10s. 6d.).

CLAIM FOR MEDICAL ATTENDANCE ON ESTATE OF LUNATIC WHO DIED IN WORKHOUSE.

G. G. writes, saying there is a £12 debt due to him for medical attendance on a patient who subsequently became insane and died in a workhouse. He believes there was some property belonging to the deceased, which came to him on his wife's death, which occurred some months before his own death. Our correspondent has applied to the solicitor who acted for the deceased and his wife; he has also applied to the *Masters in Lunacy* (*sic*). All say they are unable to help him. G. G. asks our advice.

*** We regret that we see no fair probability of our correspondent being able to get his claim paid, but this appears to us to be a matter for a solicitor to investigate and to advise upon, after having obtained all information possible pertaining to the case.

Universities and Colleges.

UNIVERSITY OF CAMBRIDGE.

Degrees.

THE following degrees have been conferred:

M.D.—A. R. Jordan, W. H. Fisher.
M.B. AND B.C.—F. Clayton, A. J. W. Cunningham, R. M. Moore, T. A. Weston, H. B. Wilson.
B.C.—E. R. Stone.

Appointments.

The following examiners have been appointed:

SECOND M.B.—*Human Anatomy:* Dr. Rogers, Dr. Duckworth. *Physiology:* Professor Halliburton, Dr. Shore.
SECOND M.B. (*Part II.*)—*Pharmacology:* Professor A. R. Cushny, Dr. F. Ransom. *General Pathology:* Professor Woodhead, Professor R. F. C. Leith.
THIRD M.B. (*Part I, Old Regulations*).—*General Pathology:* Mr. T. S. P. Strangeways, Dr. Ainley Walker. *Pharmacology:* Professor Marshall, Dr. Dixon. *State Medicine:* Dr. Anningson, Dr. Graham-Smith, Mr. J. Niven, M.A., M.B., Mr. J. E. Purvis, M.A. *Tropical Medicine and Hygiene:* Sir W. B. Leishman, Sir Patrick Manson, Dr. J. W. W. Stevens.

UNIVERSITY OF EDINBURGH.

Lord Rector's Address.

THE Right Hon. George Wyndham, M.P., D.C.L., Lord Rector of the University of Edinburgh, gave his rectorial address to his constituents, the students, in the McEwan Hall on Friday morning, October 28th. The Chancellor, the Right. Hon. A. J. Balfour, presided. The Lord Rector took for his subject "The Springs of Romance in the Literature of Europe." He traced the rise of romance to the mingling of Western and Eastern influences in the eleventh and twelfth centuries, dating it by the appearance of "The Sons of Roland." Afterwards he examined the development of romance, and defined what was meant by the romantic in literature.

Later the Lord Rector inspected the Officers' Training Corps, when there was a parade of about 300, with Captain Clive, Adjutant, in command.

The next function was a house luncheon in the University Union to celebrate the majority of the Union, when Mr. Balfour gave an interesting speech on the importance of social intercourse in university life. He spoke of the value of the Union in the social life of the student, its great importance in bringing all classes of students together to their mutual educative benefit, and the part it played generally in Scottish university life as an equivalent to the social opportunities provided by the English college system.

Mr. James Walker, C.A., Lord Rector's Assessor, treasurer of the Union, and honorary auditor of the Students' Representative Council, was presented with a silver casket "in grateful recognition of his unique services to the students of Edinburgh University, and especially to the members of the Edinburgh University Union." Sir William Turner made the presentation, Mr. J. C. Brash, M.A., B.Sc., M.B., Ch.B., senior president of the Students' Representative Council, spoke on behalf of the body of students whom he represented, and Mr. Walker replied.

The Lord Rector replied to the toast of "Our Guests," and Sir Robert Finlay proposed the toast of the "Chairman."

In the evening an unusually brilliant and successful torchlight procession took place.

University Council.

The statutory half-yearly meeting of the General Council of the University of Edinburgh was held on Friday, October 28th; the Right Hon. A. J. Balfour, M.P., Chancellor of the University, occupied the chair, and there was a large attendance. Mr. George Wyndham, M.P., Lord Rector, and Sir Robert Finlay, M.P., were present.

A motion was adopted expressing profound regret at the lamented death of His Majesty, King Edward VII, an *alumnus* of the university.

Referring to the increase in the annual grants to the Scottish universities which are to be made by the Treasury on the recommendation of Lord Elgin's committee, Mr. Clark said the University of Edinburgh would receive £12,500 out of the total of £40,000 recommended by the committee. They could assure His Majesty's Government that every penny would be well spent.

Miss MacMillan complained that the committee made no reference to the grant that had been refused for the medical education of women in separate classes. Had the Bursaries Committee considered that section of the report in which Lord Elgin's Committee pointed out that in Edinburgh the teaching of medicine and surgery to women appeared to be on a less satisfactory footing than in St. Andrews, Dundee, Aberdeen, and Glasgow?

In reply, Mr. Clark said these questions had not been considered by the Business Committee, but no doubt they would be considered by the University Court in consideration of the grant.

The subcommittee on the draft ordinance for the regulation of degrees in medicine recommended approval of the draft subject to certain modifications. The most important amendment proposed to enable instruction which might have been obtained in the subjects of the first examination in such schools and science colleges as were, or might be, hereafter recognized by the University Court for the purpose of imparting instruction in any of these subjects, to count in place of such instruction within the university, although the courses might have been attended prior to registration. Professor Schafer moved adoption of the recommendation, and said under the present regulations it was impossible for the university to recognize teaching in any branch of science which had not been conducted during the five years of the medical curriculum. That was unjust to a great many students and to the great public schools, which were doing their utmost to encourage the teaching and study of science.

Dr. Norman Walker seconded, and the report was approved.

UNIVERSITY OF ST. ANDREWS.

LORD ROSEBERY has been unanimously elected Lord Rector of the University of St. Andrews. The coming year is the five hundredth anniversary of the University.

NATIONAL UNIVERSITY OF IRELAND,

THE following candidates have been approved at the examination indicated:

M.B., B.Ch., B.A.O.—G. Siendan.
M.D.—T. H. Donovan.

A medical studentship has been awarded to Mr. W. D. O'Kelly, M.B., B.Ch., B.A.O., D.P.H.

QUEEN'S UNIVERSITY OF BELFAST.

THE following candidates have been approved at the examition indicated:

D.P.H.—R. G. M. Clements, C. Dickson, G. W. M'Comb, *J. A. Sinton.

* Passed with distinction, and awarded a special prize.

ROYAL COLLEGE OF PHYSICIANS OF LONDON.

AN ordinary quarterly comitia was held at the College on Thursday, October 27th, the President, Sir Thomas Barlow, in the chair.

Dr. Caius.

The President announced that, on the occasion of the celebration of the 400th anniversary of the birth of Dr. Caius, he and other College officers had been welcomed and entertained by the authorities of Caius College. In return, the Masters and Fellows of Caius College had been invited and attended the recent Harveian celebration at the College. On the motion of Sir William Allchin, it was resolved that a copy of the portrait of Francis Glisson, in the possession of the College, be painted and offered for acceptation to the authorities of Caius College.

Membership.

The following gentlemen were admitted Members of the College: John Bright Banister, M.D.Camb.; Alexander Edward Gow, M.B.Lond., L.R.C.P.; Frederick Arthur Lucas Hammond, L.R.C.P., Major I.M.S.; Henry Pratt Newsholme, M.B.Oxon.; Ernest Henry Shaw, L.R.C.P.; Cuthbert Allan Sprawson, M.D.Lond., L.R.C.P.

Licences.

The Licence of the College was granted to 68 gentlemen.

Jenks Memorial Scholarship.

It was announced that Mr. Gerard Gibbons had been elected Jenks Memorial Scholar.

Portrait of Sir Samuel Wilks.

A letter was received from Dr. Herbert French, offering on behalf of the staff of Guy's Hospital a portrait of Sir Samuel Wilks for acceptation by the College. The gift was accepted, and a cordial vote of thanks was passed to Dr. French, as the medium through whom the offering was conveyed.

Communications.

The following communications were received:

1. From the Home Office, respecting an International Congress for the Amelioration of the Condition of the Blind, to be held at Cairo in February next.
2. From the Secretary of the Royal College of Surgeons, reporting proceedings of their Council on October 13th last.

Committee of Management.

Dr. Frederick Taylor, who retired by rotation, was re-elected a member of the Committee of Management.

Imperial Cancer Research Fund.

Dr. F. W. Andrewes, who retired by rotation, was re-elected a member of the Executive Committee of the Imperial Cancer Research Fund.

Reports.

The following reports were read:

1. From Dr. Amand Routh, the representative of the College, on the proceedings at the International Congress of Obstetrics and Gynaecology, held at St. Petersburg on September last.

The report was received, and a vote of thanks passed to Dr. Routh for his services.

2. From the Committee of Management, dated October 4th, recommending:

(*a*) That a candidate who has passed the first examination for the degree of B.Sc. of the University of the Cape of Good Hope, with a standard of not less than 50 per cent., be exempted from the first examination of the Conjoint Board in chemistry, physics, and biology.

(*b*) That the course of laboratory instruction in public health given by an officer of the Royal Army Medical Corps in the Laboratory of the Sanitary Commission, Gibraltar, be recognized for the Diploma in Public Health, provided that the officer conducting the course is in possession of a degree or diploma in public health.

(*c*) That the course of laboratory instruction in public health given at the South African College, Capetown, be recognized for the Diploma in Public Health.

(*d*) That attendance on the practice of the City Fever Hospital, Capetown, at which instruction in the methods of administration is given, be recognized for the Diploma in Public Health.

All the recommendations were adopted.

3. The quarterly report of the examiners for the licence on the results of the July examinations was received.

Library.

Books and other publications presented to the Library during the past quarter were received, and thanks returned to the donors.

TWO lectures will be given by Dr. C. Levaditi (of the Pasteur Institute, Paris) on Monday and Tuesday next, November 7th and 8th, at 5 p.m., in the Lecture Room of the Royal Institute of Public Health. One lecture will be devoted to The Mechanism of Phagocytosis and the Importance of the Phagocytes in Immunity; the other to Recent Epidemiological and Experimental Researches on Infantile Paralysis. All interested are invited to attend.

Medical News.

THE annual dinner of the Harveian Society is to be held at the Café Royal next Thursday, November 10th. The chair will be taken by the President of the Society, Dr. Handfield Jones, at 7.30 p.m.

AT a meeting of the Society of Medical Officers of Health, 1, Upper Montague Street, Russell Square, on Friday, November 11th, at 5 p.m., Mr. W. A. Gant, L.D.S., will read a paper upon the Foundation of School Dentistry.

TWO lectures on clinical surgery will be delivered at the London Hospital Medical College, Mile End, by Mr. E. Hurry Fenwick, Professor of Urology, on November 8th and 15th at 1 p.m. The first will deal with the diagnostic aspect of the pain in kidney disease; the second with the removal of the urinary bladder. Members of the medical profession are cordially invited.

WE are requested to state that any member who may wish to have one or more copies of the Guide Book prepared for the use of those who attended the Annual Meeting of the British Medical Asscciation, held in London last July, can procure the volume free of charge (except 3d. for postage on one copy and 1d. for each subsequent copy) on application to Dr. Lauriston Shaw, Honorary Local Secretary, 429, Strand, London, W.C.

THE annual meeting of the Association of Public Vaccinators of England and Wales was held in London at the Hotel Cecil on Friday, October 28th, Dr. Bradshaw, of Liverpool, the retiring president, in the chair. Dr. A. E. Cope, of London, was elected president for the ensuing year. We hope to publish a report of the proceedings in a later issue.

THE annual Richard Middlemore post-graduate lecture will be delivered by Mr. Sydney Stephenson at the Birmingham and Midland Eye Hospital on Thursday, December 1st, at 4 p.m., the subject selected being The Consequences of Eye Strain. Members of the profession are invited to attend.

A MEETING of the Marylebone Division of the Metropolitan Counties Branch is to be held in the rooms of the Medical Society, Chandos Street, Cavendish Square, W., on Tuesday, November 8th, at 5 p.m., when the discussion on the problems of medical treatment of school children in London will be introduced by Sir Victor Horsley, F.R.S. It is hoped that a large number of members will be present at the meeting.

THE seventh International Congress of Dermatology and Syphiligraphy will be held in Rome from September 25th to 29th, 1911. The following questions are proposed for discussion: (1) The influence of recent etiological, diagnostic, and experimental researches on the direction of the therapy of syphilis, and the possibility of immunization and of a radical or abortive treatment of the infection. (2) Results of physio-therapy in the treatment of skin diseases. (3) Blastomycosis, sporotrichosis, and their relations with analogous processes.

A COUNCIL MEETING of the Association of Medical Officers of Health was held at the Holborn Restaurant on October 19th, Dr. Crookshank in the chair. The Treasurer, Dr. Gibbes-Smith, reported a balance in hand. In accordance with the decision of the general meeting held in London, the terms of a letter to be sent to a number of societies and associations which represent the various interests of practitioners who hold public appointments under local and central authorities were discussed, and it was decided to ask for a preliminary meeting in which the interested societies could discuss the methods by which a mutual co-operation could be rendered possible.

IN the course of his presidential address before the Therapeutical and Pharmacological Section of the Royal Society of Medicine, Professor A. R. Cushny described the changes in clinical sentiment which have occurred in the last sixty or seventy years. The optimistic faith in drugs which characterized the earlier part of the nineteenth century was replaced by a sceptical attitude towards drugs of every kind. The influence of pathological anatomy was predominant, medicine became pessimistic, and treatment almost wholly expectant. Hence the new school of pharmacology which arose about the middle of the century perforce abandoned the wards for the laboratory. Now the time had come when the principles learnt in the laboratory should be applied sedulously to the practice of the wards.

Letters, Notes, and Answers.

☞ *Queries, answers, and communications relating to subjects to which special departments of the* BRITISH MEDICAL JOURNAL *are devoted will be found under their respective headings.*

QUERIES.

J. P. desires to know if radium has been used in the treatment of rheumatoid arthritis; and if so, in what manner and with what result.

D. P. H. asks where he can obtain Angus Smith's varnish or similar preparation for coating the inside of an iron water cistern to prevent rust.

HEMIPLEGIA will be glad if any member can tell him of any particular kind of body for a covered motor car specially convenient for a hemiplegic gentleman. He can walk a little, but the left arm is useless.

J. R. K. writes: I should be much obliged if any of your readers could tell me of a home to which a monstrosity could go. The child is dreadful to look upon, but apparently the intelligence is fair. Age about 7.

L. I. C. would be much obliged if some reader would recommend a suitable climate (Australia preferred) for a patient who suffers from asthma. The attacks are worse in the summer, and are frequently brought on when he visits the seaside.

THIRTEEN personally suffers from psoriasis of scalp and body, and would be obliged if any reader would suggest a reliable remedy, preferably internal. Is there much danger of neuritis or malignant disease in using arsenious acid, which temporarily relieves the disease?

R. M. W. writes: A parson suffers from stammering, which he has controlled quite well until lately, and two weeks since broke down and lost his nerve. He had previously studied at special stammering schools without much benefit. He has since conducted a service perfectly with the help of ¼ grain of morphine; this cannot be repeated indefinitely. (1) How long and in what doses should it be continued? (2) Would he receive any benefit from hypnosis or verbal suggestion; and, if so, who would you advise me to send him to?

E. TREDINNICK (Craven Arms) would be glad of the opinion of any readers on the following case: A young woman, about 30, married, has within six years had four children, all born healthy and delivered normally. Each child has developed jaundice within six hours of birth and each died within three days. The body of the one before the last had a most exhaustive *post-mortem* examination performed on it, and every organ was quite normal. Mother and father quite healthy. Father when a lad suffered from tuberculous glands. No history of syphilis on either side.

W. A. L. writes: I shall be much obliged if some of your readers can throw light upon the following:—A friend of mine who is a scrap metal merchant has conducted his business for many years without special danger to his employees. Some eighteen months ago he commenced receiving consignments of old metal from broken up ships. When the metal reaches the warehouse it has to be stripped and rough cleaned. The stripping process is a mechanical one. No chemical or heat is used. The men employed upon this work develop large boils, chiefly upon exposed parts such as the forearms, though, I understand, other situations are occasionally attacked. Master and men are agreed that it is only the men who work upon the metal taken from old ships who become infected. The questions I am asked are: Why should this particular class of metal set up a furunculosis? and What steps can be taken to prevent infection?

HERTFORD writes: I should be grateful for any suggestion in treatment in the following case: A lady aged 30 for many years has had pain in the right tibia and fibula. She has had five operations in the last three years—two in the head of the tibia and fibula, the rest in the lower epiphyses. Very little disease has been found at any of the operations; the bone has in all of them been deeply opened up, and the patient says she has had no relief. The temperature is subnormal in the morning, and generally about 99·6° in the evening. There is marked hyperaesthesia all down the tibial shaft, just below the knee-joint, and just above the ankle-joint. She has had two courses of tuberculous injections with no benefit. Her opsonic index is not low. Bier's congestive treatment has been frequently tried; leeches and counter-irritants externally, iodides in varying doses internally have been tried; *x*-ray evidence by a specialist is purely negative. Beyond the thickening round the old operation scars, there are no objective signs.

ANSWERS.

DR. REGINALD MAPLES (Kingsclere) writes: In reply to "E. S." in the BRITISH MEDICAL JOURNAL of October 22nd, although I am no motorist I use in my house nothing but petrol gas, and to prevent the water-tank from freezing during the winter months—for the whole apparatus is kept in a cold out-house exposed to the north—we put into the water one in eight of crude glycerine. The natural temperature of petrol is only 0.16° F. or 0.16° of frost.

H. W. B. writes: I believe there is a powder called "Anti-freeze" which is added to a given amount of water, but should there be any part (for example, water pump), made of aluminium, this would be harmful, and a mixture of one-third commercial glycerine, two-thirds water should be substituted, after emptying the water cooling system. It should be done away with, of course, during the summer months.

ABDOMINAL DISEASES.

A MEMBER.—The following works may meet our correspondent's requirements: *Diseases of the Stomach.* By A. W. Mayo Robson and B. G. A. Moynihan. Second Edition. (London: Baillière, Tindall, and Cox. 1904. 15s.) Reviewed in BRITISH MEDICAL JOURNAL, October 22nd, 1904, p. 1091. *Abdominal Operations.* By G. A. Moynihan, M.S., F.R.C.S. Second Edition. (Philadelphia and London: W. B. Saunders Company. 1906. 28s.) Reviewed in BRITISH MEDICAL JOURNAL, July 27th, 1907, p. 207. *Clinical Lectures and Essays on Abdominal and Other Subjects.* By H. D. Rolleston. (London: Sidney Appleton. 1904. 5s.) Reviewed in BRITISH MEDICAL JOURNAL, September 24th, 1904, p. 758. *Abdominal Pain: its Causes and Clinical Significance.* By A. E. Maylard. Second Edition. (London: J. and A. Churchill. 1906. 7s. 6d.) Reviewed in BRITISH MEDICAL JOURNAL, January 19th, 1907, p. 146.

MEDICAL FOLK LORE.

NURSERY RHYME writes: "Folk Lore" will probably get the information he requires by writing to the Honorary Secretary, Folk Lore Society, 22, Albemarle Street, W.

DR. DAN M'KENZIE (London) writes: In reply to "Folk Lore's" request for books or papers dealing with the folk-medicine in the West of England I venture to refer him to an article by Dr. G. F. Sydenham which appeared in the BRITISH MEDICAL JOURNAL, November 10th, 1900, p. 1367. "Folk Lore" should, if he wishes to become acquainted with the medical folk lore of England, consult W. G. Black's *Folk Medicine*, a book published by the Folk Lore Society in 1883. Here he will find many references of interest. It would also be advisable for him to consult the files of *Folk Lore*, the journal of the Folk Lore Society.

LETTERS, NOTES, ETC.

A DISCLAIMER.

DR. JULIA L. PRINGLE (Dundee) writes: There appeared in the issue for October 20th of the *Dundee Courier* an article entitled "Women and the Medical Profession," in which my name, qualifications, etc., figured. The correspondent for the above newspaper had a conversation with me to elicit facts regarding the medical education of women, and in spite of my express warning that I wished nothing personal to appear in print, I regret extremely to find that this grave mistake has been made, and I beg to disclaim all responsibility for such apparently personal advertisement.

HAEMORRHAGE OF THE NEWBORN.

DR. J. G. BLACKMAN, M.D.Brux. (Portsmouth), writes: The memorandum in the JOURNAL of October 22nd brings to my mind an exactly similar case which occurred quite recently in my practice. The child, a male, was born at midnight on October 8th, and severe haemorrhage from the nose, mouth, and rectum occurred on the 10th. It continued at intervals for twenty-four hours, and since then the child has got on quite well. I have seen one or two cases, and they have always puzzled me as to the pathology. In this case I gave hyd. cret., as I suspected a syphilitic taint.

ST. PAUL'S "THORN IN THE FLESH."

DR. GEORGE JONES (London, S.E.) writes: The last words of the second lesson last Sunday, October 23rd, supply the answer to Dr. Welch's question. 2 Thes. iii, 17: "The salutation of me Paul with mine own hand, which is the token (σημεῖον = sign) in every epistle: so I write." (R. V.) On this Bishop Ellicott remarks: "These words apparently form the commencement of the autograph salutation with which the Apostle attests the . . . authenticity of the epistle. . . . The οὕτως (so) . . . points to the visible . . . difference between the handwriting of the transcriber and of the Apostle." In a long note (p. 135, ed. 1866) the Bishop collects all the New Testament learning on this point. The Vulgate has: "*Salutatio, mea manu Pauli: quod est signum in omni epistola. Ita scribo.*"

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